ELECTRICAL SOUTH

Serving the 18 Southern

Comprehensive discussion of unit-price charges for extras—pg. 22

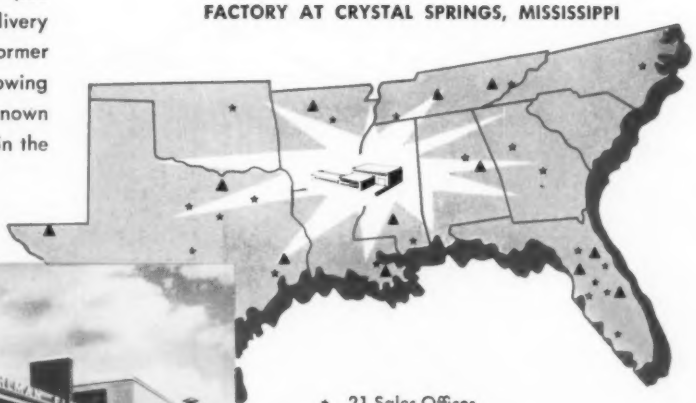
Y, 1957

University Microfilms
313 No First St
Ann Arbor Mich 4

Why KUHLMAN'S Southern Factory Is Your Ideal Transformer Source...

Anywhere in the South you can get the transformers you need—when you need them—from Kuhlman. Our modern factory at Crystal Springs, Mississippi, and our trained Southern sales personnel (see map), will give you prompt service and fast delivery on all your distribution and power transformer needs. Kuhlman is proud to be part of the growing South, and to have been the first nationally known transformer manufacturer to build a factory in the South to serve the South.

FACTORY AT CRYSTAL SPRINGS, MISSISSIPPI



• 21 Sales Offices

▲ 12 Distributing Centers

CRYSTAL SPRINGS, MISSISSIPPI . . . both serving and contributing to the development of diversified Southern industry, this KUHLMAN factory produces a complete line of power and distribution transformers.

HOUSEPOWER HELPS YOU LIVE BETTER ELECTRICALLY

LIVE BETTER ELECTRICALLY

573

KUHLMAN ELECTRIC COMPANY

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

Now!
ADVANCE FLUORESCENT LAMP BALLAST
CAT. NO. SEQM-240-S
CBM CERTIFIED
FOR TWO 48", T-12, 38W SLIMLINE LAMPS OR
FOR TWO 48", T-12, 40W INSTANT START LAMPS OR
FOR TWO 60", T-17, 40W INSTANT START LAMPS
118 VOLTS • 60 CYCLE • 430 M.A.
ADVANCE TRANSFORMER CO.

ADVANCE FLUORESCENT LAMP BALLASTS INDIVIDUALLY PACKAGED

Yes, now ADVANCE Quality Fluorescent Lamp Ballasts packaged in modern individual cartons are available from your authorized ADVANCE Distributor. These individually packaged ADVANCE Fluorescent Lamp Ballasts put an end to loose dangling lead wires, prevent damage to lead wire and assure you of factory fresh ballast stock always. End labels on the new individual cartons permit instant identification of ballast type, catalog number and pertinent electrical characteristics.

Your authorized distributor carries a complete stock of all popular ADVANCE ballasts to give immediate replacement service for any make fluorescent lamp ballast whenever replacement is necessary. Simply bring the inoperative ballast to any ADVANCE Service-Stocking Distributor. The ADVANCE cross-reference guide shows at a glance the replacement needed, and in a few moments, you can be back on the job with the correct ballast.

To give better customer service, save time and effort . . . insist on quality ADVANCE Fluorescent Lamp Ballasts in the new modern individual cartons.

For further details on how you can increase your ballast sales with ADVANCE Fluorescent Lamp Ballasts in modern individual cartons, contact your ADVANCE salesman, or write, phone or wire today.

ALL HPF BALLASTS CARRYING THE ADVANCE LABEL ARE DESIGNED TO CONFORM TO CBM SPECIFICATIONS

The Heart of the Lighting Industry

ADVANCE

CBM CERTIFIED

World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.

2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

ELECTRICAL SOUTH is published monthly at 116 E. Crawford Street, Dalton, Georgia, by W. R. C. Smith Publishing Company. Executive and Editorial Offices: 806 Peachtree Street, N. E. Atlanta 8, Georgia. Second-class mail privileges authorized at Dalton, Ga. Subscription Rates: United States and Possessions, $1.50 per year; Canada and Foreign Countries, $10.00 per year.

Volume 37 **Number 2**

Postmaster, Send notices by Form 3579 to 806 Peachtree St., N. E., Atlanta 8, Ga.

An important message from Southwire about aluminized steel wire

FOR ACSR CORES, GUY STRAND, MESSENGER AND GROUND WIRES, TELEPHONE AND STATIC WIRES

SOUTHWIRE is proud to be among the first in the industry to offer *aluminized steel wire** in our full line of steel wire products. To electric and telephone systems plagued with costly rust and corrosion problems, this new product offers added protection at substantial savings. Here are the facts:

Laboratory tests indicate Aluminized Steel compares most favorably in corrosion resistance to Class B Zinc coated steel wire.

Field tests indicate Aluminized Steel is equal or superior in holding or slippage characteristics to galvanized strand.

Aluminum oxide protection retards penetration of most corrosive media.

It offers electrochemical protection in the event that the coating should become nicked or pierced.

Aluminized strand can be stretched or sagged with the same tables as for comparable galvanized strand.

Wherever salt air or industrial atmospheric conditions present a rust or corrosion problem, SOUTHWIRE Aluminized Steel Wire products warrant your serious consideration. Our representatives will be glad to discuss the matter with you, or your inquiry will be welcomed at our plant.

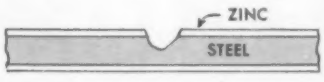
*Acco Aluminized

STRENGTH OF STEEL • CORROSION RESISTANCE OF ALUMINUM

"HOT-DIP ALUMINUM COATED"

ELECTROCHEMICAL PROTECTION OFFERED BY ALUMINIZED WIRE

Should the coating become nicked or pierced, exposing a small area of steel, the position of Aluminum in the Electromotive Force Series of Elements in relation to iron or steel is such that slow and long-range Anodic protection is afforded.

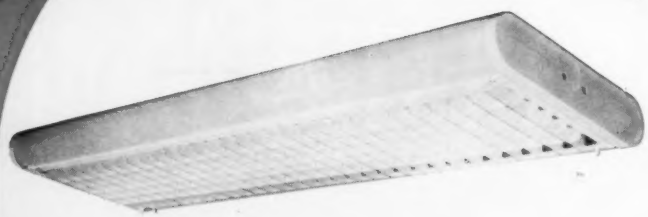


Zinc to steel galvanic action is similar to that of aluminum to steel; however, since zinc oxide is far more readily soluble by the elements, the zinc coating is rapidly sacrificed.

Southwire Company

TErrace 2-6311 CARROLLTON, GEORGIA

L&P Fluorescent Fixtures



THE MADISON

Extreme shallowness (3¼") adds to highly popular appearance. Variations in style permit great versatility in purpose and location. An all-around winner!

In the Spotlight FOR FEBRUARY

This L & P fixture is only one of Light & Power's complete line of fluorescent fixtures—with fine material, expert craftsmanship and quality control built into every unit. The result? Dependability, beauty and efficiency . . . every time!

LIGHT & POWER UTILITIES CORP.

Distributed by Electrical Wholesalers Only

Write or wire today for catalog and prices.

LIGHT & POWER UTILITIES CORP.
1035 Firestone Blvd., Memphis, Tenn.

There's an L&P *Representative Near YOU!*

For further information and prices on L & P fluorescent fixtures—standard or "custom-made"—check the following list, and phone or write the L & P representative nearest you:

Walter J. Huemmer
Dallas Transfer & Terminal Warehouse
Dallas 2, Texas

E. B. Thornton
2829 Sunset Blvd.
Houston, Texas

V. E. Stephens
3523 Dutton Drive
Dallas, Texas

N. B. Nichols
2509 Bishop
Little Rock, Ark.

Craig-Owen
306 E. 11th St.
Chattanooga, Tenn.

C. V. Hammon
845 Southwest 52nd St.
Oklahoma City, Okla.

Irving Milow
415 Clover St.
Rochester, N. Y.

C. K. Ramond
1021 Carondelet Bldg.
New Orleans, La.

Tom Melady
1021 Carondelet Bldg.
New Orleans, La.

M. B. Mendenhall
4506 Country Club Blvd.
Sioux City, Iowa

W. J. Milner
148 Walker S. W.
Atlanta, Ga.
(Also: St. Simons Island, Ga.)

J. Louis Weyhing
1914 Rutherford Ave.
Louisville, Ky.

Dave Otey
8807 Dena Drive
Richmond, Va.

Clyde Haney
148 Walker St., S.W.
Atlanta, Ga.

S. Dan Haney
148 Walker St., S.W.
Atlanta, Ga.

Irvin Spero
3309 Beechwood Ave.
Cleveland, Ohio

Light & Power Utilities Corp.
1035 Firestone Blvd.
Memphis, Tenn.

ELECTRICAL SOUTH

SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

February, 1957 — **Vol. 37—No. 2**

CARL W. EVANS, *Editor*
SID WRIGHTSMAN, JR., *Associate Editor*
VERA M. BECK, *Assistant Editor*
BARON CREAGER, *Southwestern Editor*
(7713 *Inwood Road, Dallas 9, Texas*)
T. W. McALLISTER, *Vice-Pres., Editorial Director*

FIELD EDITORS

BILL CROWELL, Raleigh, N. C.
C. LORENTZSON, Atlanta, Ga.
S. W. ELLIS, Little Rock, Ark.
GRIER LOWRY, Kansas City, Mo.
WENDELL O. GIVENS, Birmingham, Ala.
B. S. MILLER, Washington, D. C.
L. H. HOUCK, Jefferson City, Mo.
HAL M. NEWSOME, Miami, Florida
RICHARD LANE, Memphis, Tenn.
WARNER OGDEN, Knoxville, Tenn.
ED LONDON, Jackson, Miss.
W. W. WESTBROOK, New Orleans, La.
C. E. WRIGHT, Jacksonville, Fla.

•

FRANK P. BELL, *Business Manager*
J. A. MOODY, *Production Manager*
H. REDFERN HOLLINS, *Director Market Research*

Business Representatives

New York:
WARREN V. SMITH, 41 Russell Rd., Fanwood, N. J. Tel. Fanwood 2-9292.

Cleveland:
W. G. SHEEHAN, 17021 Amber Dr., Cleveland 11, Ohio. Tel. Winton 1-1306

Chicago:
ROBERT A. BLUM, 333 No. Michigan Ave., Chicago 1, Ill. Tel. Central 6-6964

Los Angeles:
L. B. CHAPPELL, 8693 Wilshire Blvd., Beverly Hills, Calif. Tel Olympia 2-1490.

Charlotte:
W. C. RUTLAND, P. O. Box 102, Gastonia, N. C. Tel. University 7 7995

Dallas:
BARON CREAGER, 7713 Inwood Road, Dallas 9, Texas. Tel. Fleetwood 7-2937

Miami:
RAY RICKLES, Chamber of Commerce, Bldg. Miami, Fla. Tel. Franklin 9-1495.

•

ANNUAL SUBSCRIPTION—$1.50
FOREIGN—$10.00

•

Editorial and Business Offices
Tel. Trinity 4-4462
806 Peachtree Street, N. E.
Atlanta 8, Georgia

In This Issue

Unit-price charges for extras	22
Renovating an electrical system economically	25
Economics of distribution systems	26
Business decisions affect your tax returns	28
High frequency for fluorescent lighting	29
Arkansas' most talked about house	30
Emergency lighting for fire safety	32
Personal contacts sell more electric heat	34
Maintenance points for electric space heaters	36
Comment on the Code	38
Electrical South data sheets	44
Utility engineers' forum	49
AIEE winter meeting sets session record	49
Microwave system mushrooms with demand	60
Three-phase power for residential service	64
Notes on new utility equipment	68

Economic comment	8
News of the industry	74
Dates ahead	80
News about people	82
Free bulletins	89
Technical books	90
New electrical products	92

Published Monthly by
W. R. C. SMITH PUBLISHING COMPANY
Dalton and Atlanta, Ga.

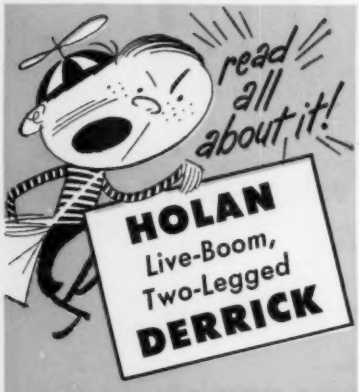
•

W. J. ROOKE ——— *Chairman of the Board*
RICHARD P. SMITH ——— *President and Treasurer*
T. W. McALLISTER ——— *First Vice-President*
E. W. O'BRIEN ——— *Vice-President*
A. E. C. SMITH ——— *Vice-President*
JOHN C. COOK ——— *Vice-President*
A. F. ROBERTS ——— *Secretary*
SEBA J. JONES ——— *Asst. Secretary and Treasurer*

•

Publishers Also of
SOUTHERN POWER & INDUSTRY
SOUTHERN HARDWARE — TEXTILE INDUSTRIES
SOUTHERN AUTOMOTIVE JOURNAL
SOUTHERN BUILDING SUPPLIES

Copyright 1957, W. R. C. Smith Publishing Co., Atlanta, Georgia



AVAILABLE WITH AUTOMATIC SIDE LEG COUPLING

Holan's new Series 5700 Power Derrick lifts 6000 pounds, handles 70-foot poles, folds overhead for stowage. Available with pin locking or exclusive hydraulic sleeve locking for side legs.

Write for new Series 5700 Catalog.

J.H. HOLAN CORPORATION
4100 WEST 150TH STREET
CLEVELAND 11, OHIO

OTHER PLANTS · GRIFFIN, GA., PHOENIX, ARIZONA, BRANTFORD, ONTARIO

To: J. H. Holan Corporation
4100 West 150th Street
Cleveland 11, Ohio

Please send me the new bulletin about Holan's Series 5700 Power Derrick.

Name _____ Title _____

Address _____

City _____ Zone _____ State _____

The 1957 edition of the ELECTRICAL SOUTH Directory is available NOW!

Now, a special Directory for the use of the Southern and Southwestern electrical trade has been published by ELECTRICAL SOUTH.

This Directory of Electrical Manufacturers and their Southern and Southwestern Representatives has been a "smash hit" because it fills a long felt need. The tremendous increase in electrical business in the South in recent years has led many more electrical manufacturers to establish representation in this fast growing area. These representatives offer valuable services to the electrical wholesalers and the electric utility companies, as well as other branches of the electrical industry.

In compiling this Directory, we have endeavored to furnish the most complete listing possible of all electrical manufacturers in alphabetical order together with their Southern and Southwestern representatives.

For convenience, a number of manufacturers have included cross-reference advertising on their products. This extra service will help locate special facts and specifications and other pertinent product data.

So far as we know, this is the first Directory of its kind ever published for the Southern electrical trade.

You may obtain your copy at a cost of only $2.50. Address order to:

ELECTRICAL SOUTH Directory
806 Peachtree St., N. E.
Atlanta 8, Georgia

Another **TRIANGLE** *multiple product Job*

PALM BEACH

Palm Beach Towers. Florida's Largest Apartment Hotel

...designed for luxurious year-round apartment living:

1,100,000′ of TRIANGLE WIRE and CABLE
169,000′ of TRIANGLE CONDUIT
52,000′ of TRIANGLE COPPER TUBE

Luxury *demands* Quality. That's why Triangle conduit, wire, cable and copper tube were specified for the job.

Triangle is famous for the finest quality building products that research and modern equipment can produce.

Triangle products are nationally distributed—representatives are located in principal cities in the United States. For your next installation, you'll find it pays to call Triangle!

Palm Beach Towers, scheduled for opening December 1, 1956, is completely air conditioned, with restaurants and specialty shops provided to make it one of America's finest resort hotels.

ARCHITECT: John Hans Graham
GENERAL CONTRACTOR: The Taylor Construction Co.
ELECTRICAL CONTRACTOR: Interstate Electrical Co.
PLUMBING CONTRACTOR: Clarence Coston

let's take a quick look at **TRIANGLE**

Up to date research

Ever expanding plants

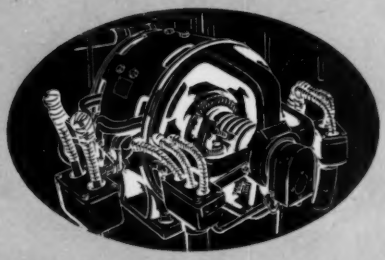
Large stocks in redistribution centers

The Triangle Trademark is your guarantee of quality

It Must Be Right
The Trade Mark of TOP Quality
TRIANGLE

TRIANGLE
Conduit and Cable Co., Inc.
NEW BRUNSWICK, NEW JERSEY

DUTCH BRAND
Plastic Electrical Tape



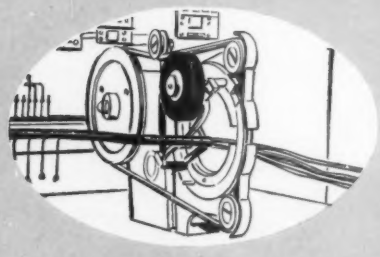
MAINTENANCE

Oil and dirt proof. Provides neat, positive insulation for all high voltage motor leads.

efficient, low cost insulation for the manufacture

PRODUCTION

Conforms to provide a safe, strong insulating seal in wiring harness.



and maintenance of electrical equipment

CONSTRUCTION

The perfect insulation for splices and terminals in junction boxes.

VERSATILE—Dutch Brand Plastic Electrical Tape offers maximum versatility and performance . . . especially where space is limited . . . it stretches 150% . . . conforms to irregular surfaces.

DURABLE—resists galvanic corrosives, rot, mildew, fungus, severest weather, and is not affected by water, oil, grease, acids or alkalies.

ECONOMICAL—the variety of sizes and widths available permit maximum tape economy for each job. Dutch Brand polyvinyl Plastic Electrical Tape .007″ thick for general use; .010″ thick tape for heavy duty protection and for use with power driven taping machines; and .020″ thick tape for extra heavy duty where abrasion and wear are met.

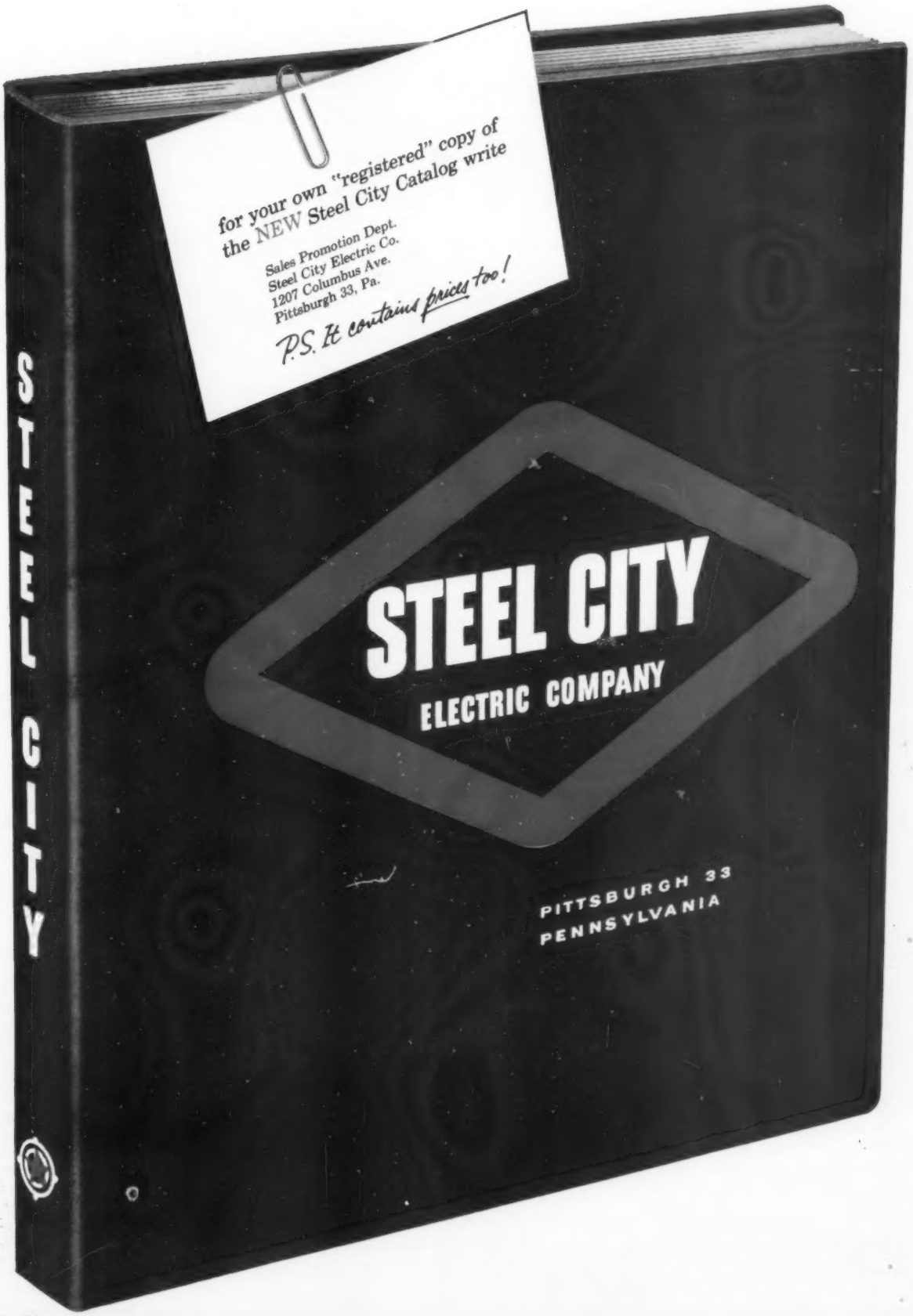
Call your Dutch Brand Man for a demonstration!

Tool Up with Dutch Brand Tape!

. . . and "Big Four in Electrical Tapes" tells you how. This new booklet is loaded with money-saving ideas. Write today!

JOHNS-MANVILLE DUTCH BRAND PRODUCTS OF QUALITY

Johns-Manville
DUTCH BRAND
PRODUCTS
7800 WOODLAWN AVENUE • CHICAGO 19, ILL.


for your own "registered" copy of
the NEW Steel City Catalog write
Sales Promotion Dept.
Steel City Electric Co.
1207 Columbus Ave.
Pittsburgh 33, Pa.
P.S. It contains prices too!
STEEL CITY
ELECTRIC COMPANY
PITTSBURGH 33
PENNSYLVANIA
STEEL CITY

Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Consumer and the future

The strength of the economic system, particularly in the light of present prosperous conditions, seems to be in the hands of the American consumer. The point has been reiterated time and again in this column, and the theory has gained widespread credence in the writings of many leading economists.

The simple fact that people have been both able and willing to buy all types of merchandise and services has permitted the economy to grow and develop at a pace unprecedented in history and to heights never before achieved by an economic system. The big question of what lies ahead thus must rest largely upon the question of whether or not the American consumer will be willing to continue his unrestricted buying on both cash and credit terms.

In reference to the last point, there are many restrictive devices that can be used to curtail popular enthusiasm for further extension of credit. The tight money market with high interest rates, various Governmental restrictions, and other factors, can artificially limit the ability of a consumer to purchase goods and services on a credit basis. Up to the present moment these factors have had a limiting effect but have not developed a complete halt to credit spending. How long the consumer will continue to spend freely under such adverse circumstances may provide a clue to the potential continuity of the present prosperous economic cycle.

Psychology of buying

It would appear to be more important, however, to observe the various factors that may adversely affect the psychology of buying during the coming year in order to try and foresee the future economic trends.

Certainly the factor of continuing inflation is of real importance in gauging consumer buying attitude. A slow but positive increase in the cost of goods and services seems destined to continue. Although this price rise has not gotten out of hand as yet, it has become serious enough to worry Government economic observers.

The tip-off to this condition was contained in President Eisenhower's recent message to Congress on the State of the Union when he pointed to this problem as one that required a positive program for correction.

One has only to go back to the last election to remember remarks made about a hold-the-line battle against rising prices that had been eminently successful during the preceding four years. Apparently, inflation is due to be studied most seriously in order to maintain consumer interest in buying.

A strong factor that is presently working against consumer buying is the level of financial return that can be earned by saving rather than spending. Interest rates on savings and returns on other forms of investments have pushed slowly but surely upward so that it has now become a serious decision as to whether to spend or to save money.

Economists have long described the interest rate as being the control feature of the savings mechanism. A high interest rate on savings, for example, will deaden the pain of abstention from purchasing items that may not be absolutely necessary for present use.

Just so today. As more and more consumers realize that by foregoing certain expenditures they can make their dollars earn a rather substantial and satisfying return, then a definite reduction in the buying force can be expected. If and when such a situation does develop, the market for materials may be reduced and a policy of business and industrial retrenchment could take place.

This thought is not meant to provide "scare headlines," nor should it be taken as a prognostication of things to come. It merely should be interpreted as an example of the strength of the consumer in the modern economic picture. True, there are many other factors that must be considered as well, but any sound merchandiser will say that goods without buyers are valueless.

Industrial side of picture

Industry has been in the throes of marked plant expansions, and the groundwork has been laid for a steadily increasing output of economic goods for the American market. A reduction of the supply of buyers can easily create a serious squeeze between large plant facilities, heavy labor and material costs, growing inventories, and an inability to merchandise goods at a fair rate of return.

This invariably means a potential reduction of profit margins for most producers and dealers. A quick glance at the annual reports of leading companies today shows that in spite of greater sales volumes, the margin of profit has been steadily shrinking over the past year.

With this situation in mind, it is of vital importance for producers and dealers to pay more heed to consumer demands, both in terms of quality and in relation to economy. A high quality product on the market invariably denotes value in the mind of the buyer. As such, he is more apt to continue buying in spite of higher savings returns. A product that is economical to operate and has a large amount of built-in service also dispels to a marked degree the fear of spending in times such as these. Both factors are important if buyers are to be enticed into the market place.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

OVERNIGHT

SERVICE

ANYWHERE

COMPLETE STOCK

maintained for your convenience in these cities:—

ATLANTA
CHARLOTTE
CHICAGO
CINCINNATI
DALLAS
DENVER
DETROIT
LOS ANGELES
MINNEAPOLIS
PHILADELPHIA
ROCHESTER
SAINT LOUIS
SAN FRANCISCO
SEATTLE
WILLIAMSTOWN

BE *Sure* with

CORNISH

WIRES • CABLES • CORD SETS

When you need BLUE CHIP wire products QUICK . . . and no alibis . . . depend upon CORNISH! We now stock the most wanted items in FIFTEEN strategically located cities. Whatever you need, wherever you are, we'll give you OVERNIGHT service, anywhere in the United States.

"MADE BY ENGINEERS FOR ENGINEERS"

CORNISH WIRE COMPANY, INC.

50 Church Street — New York 7, N. Y.

Creators and Manufacturers of

CORDS AND CORD SETS FOR HOME, FARM AND INDUSTRY

Support your local ADEQUATE WIRING BUREAU Program

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

1048—Plug-in Strip
An illustrated catalog showing the complete "Plug-in" Strip line has recently been published by National Electric Products Corp., Pittsburgh, Pa. This eight-page illustrated brochure pictures the three and six foot standard lengths of the multi-outlet branch circuit assembly.

1086—Cable Connectors
Tomic Sales and Engineering Co., 4864 Woodward Ave., Detroit 1, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

1088—Fittings and Fixtures
A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg. Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1092—Electrical Boxes
Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 12, Pa., offers a catalog of their complete line.

1130—Conduit Fittings
The latest completely illustrative catalog on their diversified line of conduit fittings is announced by the Atlantic Conduit Fittings Co., 589 Atlantic Ave., Boston 10, Mass.

1136—Space Heating Guide
Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on study of several thousand installations of electric heat and is a handly reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples.

1150—Fluorescent Fixtures
Light & Power Utilities Corp., 1035 Firestone Blvd., Memphis, Tenn., has printed a new catalog of fluorescent lighting fixtures. The new catalog is divided into six sections, each printed in its own distinctive colors. First section is devoted to "General Data" and details to L&P manufacturing.

1166—Electrical Fittings
A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1184—Approved RHW Wire
Bulletin No. 1018 describing first Underwriters' Approved Type RHW Wire, developed to meet the new National Electrical Code standards, is available from Simplex Wire and Cable Co., 79 Sidney St., Cambridge 39, Mass.

1190—Electrical Fittings
Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.

1192—Wire Pulling Lubricant
Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 3812 150th St., Cleveland 11, Chio.

1214—General Catalog
General catalog of Royal Electric Corporation, Pawtucket, R. I. covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1218—Carbon Products
A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes grade recommendations characteristics and description of brush grades is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.

1220—Stadium Lighting
The Pyle-National Co,, 1334 N. Kostner Ave., Chicago, Ill., announces the availability of a new eight-page bulletin, No. 605, on stadium lighting, describing in detail floodlighting of a typical outdoor athletic arena stressing the importance of using fully enclosed floodlights.

1224—Electrical Equipment
The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches, Service Equipment, Distribution Panels and "E-Z-RED" Circuit Breakers.

ELECTRICAL SOUTH
806 Peachtree St., NE
Atlanta 8, Ga.

February, 1957

Gentlemen:

Please send me the bulletins and catalogs indicated.
(Print Plainly)

Name ..... **Title** .....

Company .....

Address .....

City & State .....

Circle numbers below. Bulletins and catalogs will be mailed promptly.

1048	1086	1088	1092	1130
1136	1150	1166	1184	1190
1192	1214	1218	1220	1224
1230	1238	1240	1244	1248
1250	1254	1262	1264	1266
1268	1270	1276	1278	1280
1282	1284	1288	1290	1292
1294	1296			

HERE'S WHY

CERTIFIED CBM CERTIFIED by ETL BALLASTS

ENJOY A PREFERENCE OF NEARLY 2 TO 1

In 1955, nearly 2 out of 3 HPF ballasts were CERTIFIED CBM BALLASTS.

There is just one reason for this preference:

CERTIFIED CBM BALLASTS assure more satisfactory and economical fluorescent lighting.

Built to exacting specifications that provide the precise electrical needs of fluorescent lamps, and periodically checked by Electrical Testing Laboratories, Inc., CERTIFIED CBM BALLASTS are your assurance of:

RATED LIGHT OUTPUT • RATED LAMP LIFE
LONG BALLAST LIFE • TROUBLE-FREE OPERATION
FREEDOM FROM NOISE

. . . all contributing to better lighting, lower maintenance cost and more economical fluorescent operation.

*Total ballast sales from U. S. Dept. of Commerce. CERTIFIED CBM BALLAST sales from ETL reports.

Send for free booklet, "Why It Pays to Use CERTIFIED CBM BALLASTS in Fluorescent Lighting Fixtures".

CERTIFIED BALLAST MANUFACTURERS

2116 KEITH BUILDING • CLEVELAND 15, OHIO

Seven of the country's leading manufacturers of ballasts make CERTIFIED CBM BALLASTS. Participation in CBM is open to any manufacturer who wishes to qualify.

1230—Compression Connectors

An illustrated 18-page bulletin (13A) describes Squeezon compression connectors for all overhead distribution connections from line wire to ground rod. Offered by James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., the bulletin also describes the mechanical and hydraulic installation tools required and tells where to use each.

1238—Selecting Fuses

A 12-page descriptive handbook "Fuseology" tells how to get safest, most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses—how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1240—Lighting Fixtures

Prescolite Manufacturing Corp., 2229 Fourth St., Berkeley 10, Calif., now has available a 20 page color catalog, No. 31-F, describing their complete line of lighting fixtures including recessed series and accessories, surface series and accessories, exit lights, and aisle lights. A typical installation and dimensional drawing are shown for each fixture.

1244—New Electrical Fittings Catalog

Concise 36-page catalog illustrates and describes a complete line of electrical fittings, cable racks and wiring specialties. The catalog contains many detail drawings, clear-cut photographic illustrations of mast fittings, cable connectors, straps, hangers and ground clamps in a wide variety of types and sizes. For your free copy, write The M. & W. Electric Mfg. Co., East Palestine, Ohio.

1248—Conductor Armor

A new catalog of Superformed Armor Rods, Lineguards, Patch Rods, and Tap Armor describing various uses and applications of these products on overhead conductors is offered by The Fanner Manufacturing Company, Brookside Park, Cleveland 9, Ohio.

1250—Electrical Enclosures

Catalog No. 5354 currently being offered to the trade by B & C Metal Atlanta, Ga., is a well-organized, 66-Stamping Co., 590 Means St., N. W., page manual giving complete descriptive information, prices, and specifications on all items in the B & C line of electrical enclosures. Copies are available free of charge to electrical contractors.

1254—Construction Anchors

"Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

1262—Fluorescent Fixtures

The new loose-leaf catalog recently isued by Southern Lighting Manufacturing Co., 501 Elwell St., Orlando, Fla., contains complete diagrams, specifications, and descriptions for all fluorescent fixtures which they manufacture. In addition to the information on commercial, industrial and school fixtures, the catalog also lists hangers, troffers, troffer accessories, and incandescents which are available from the firm.

1264—Thiel Fasteners

Literature is now available on Thiel Easy Drive staples and other fasteners such as Hump Drive "Nail-Its," "Grip Type" 1-hole pipe straps, hangers, etc. Write to Thiel Tool and Engineering Co., 1417 N. Market St., St. Louis 6, Mo.

1266—Metal-Clad Switchgear

Detailed information on metal-clad switchgear is now available in two special bulletins, 7004-B and 7004-C. These booklets give descriptions, application data and specifications on units up to 15 kv and 500,000 kva interrupting capacity. Wire I-T-E Circuit Breaker Co., 19th and Hamilton St., Philadelphia 30, Pa.

1268—Lighting Fixtures

The Perfeclite Co., 1457 East 40th Street, Cleveland 3, Ohio, makes available the following literature: (1) Data Folder 54-B—4 pages of engineering information, prices and specifications on Plastic Indirect Concentric Ring Luminaires. (2) Data Folder EX-55-A—10 pages of information on Exit Units for all building locations. Complete engineering data and prices given. (3) Data Folder 56-A—information on Ceiling Pan Fixtures and Vapor Proof Prismatic Exterior Fixtures.

1270—Aerial Ladders

J. H. Holan Corp., 4100 W. 150th St., Cleveland 11, Ohio, has just published a 4-page catalog on their Series 2200, Mechanical Ladder. They also have a new catalog on their Series 2100 All-Hydraulic Ladder.

1276—Attic Fans

A new four-page, two-color catalog (Bulletin 7514) describing the new Model CA Ventura attic fans for residential "comfort cooling" is now available from American Blower Corp., Detroit 32, Mich.

1278—Porcelain Insulators & Hi-Line Hardware

Knox Porcelain Corp., Knoxville 1, Tenn. has recently released catalogs containing complete information on their suspension, pin-type, spool and guy strain insulators as well as Hi-Line hardware and bushings.

1280—Electric Heating

Electromode Division of Commercial Controls Corp., 45 Crouch St., Rochester, N. Y., has issued a new catalog listing their complete line of electric heaters, including bathroom, wall-type, portable, baseboard heating, radiant heating panels, various industrial units, and combinations. Also included in Catalog No. 31-K-3 are complete specifications and price list.

1282—Exit Lights

A four-page catalog providing illustrations and specifications for their complete line of exit lights has been released by Curtis Lighting Co., 6135 W. 65th St., Chicago 38, Ill. Types of mountings illustrated include recessed, end to wall, ceiling, direct wall, and pendant.

1284—Electric Radiant Heating

The design and installation of electric radiant heating is covered comprehensively in two publications just released by General Electric Co., 95 Hathaway St., Providence 7, R. I. Designers of heating systems will find valuable information in a 24-page Electric Radiant Heating Design Manual. A 36-page manual explains and illustrates how to install G-E Electric Radiant Heating in homes.

1288—Electric Ventilators

An illustrative 8-page folder, Bulletin 620-L, showing typical installations of a complete line of ventilators for wall, ceiling, laundry, bathroom, kitchen, and small rooms, is available from Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif.

The folder includes dimensional drawings of installations helpful to building and electrical contractors.

1290—Wiring Equipment

Keystone Manufacturing Co., 23328 Sherwood, Center Line, Mich., has issued a new catalog (No. 156) giving complete specifications and illustrations on their line of wiring installation equipment. Included in the 40-page catalog are wireways and fittings, cutout boxes, outlet boxes, switch boxes, and cabinets, giving Code requirements, and price sheet.

1292—Conduit Bender

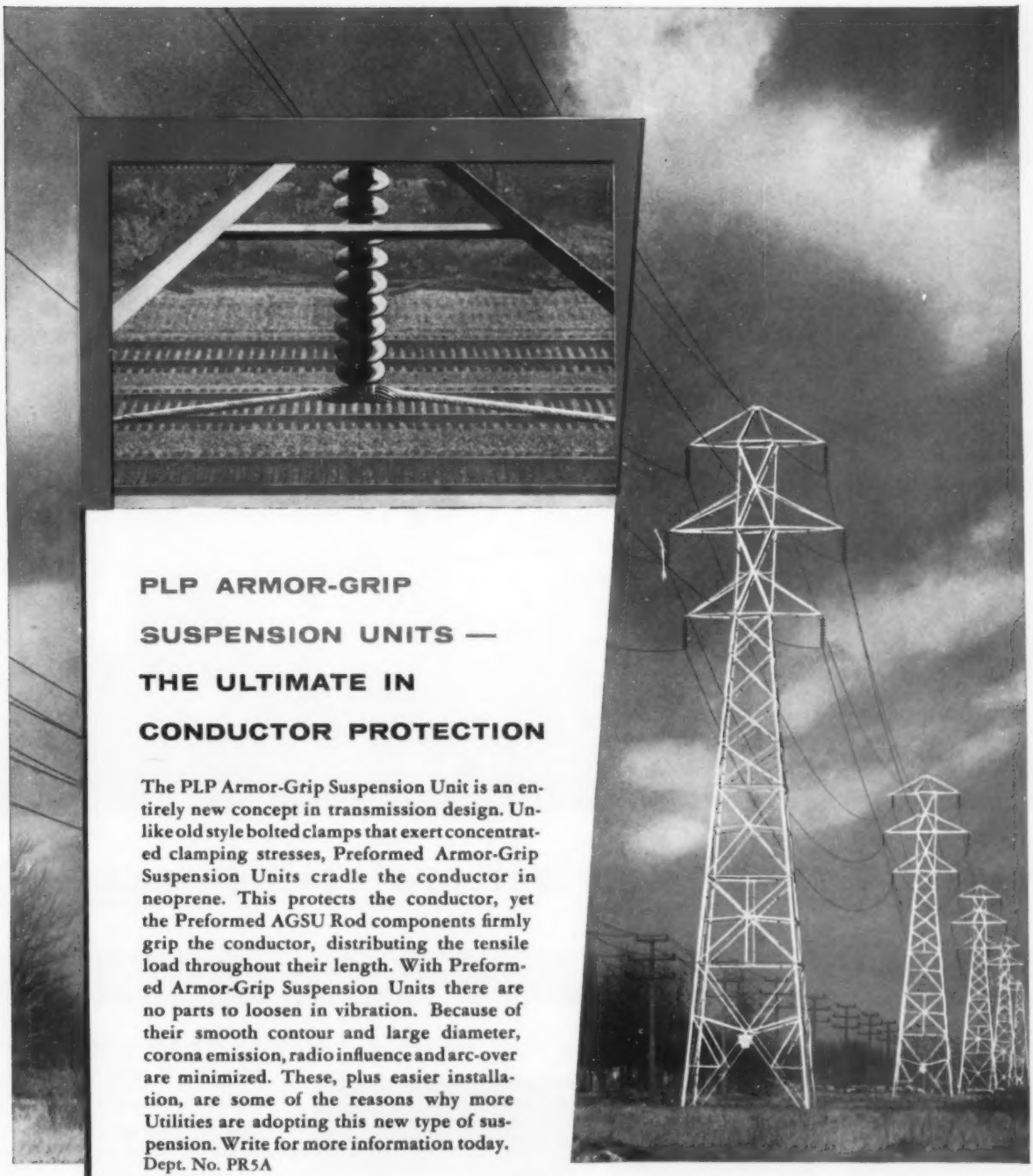
A new bulletin containing operating instructions on several easy methods of bending rigid and thin-wall conduit with the "Chicago" Bender is now available from Gustave Lidseen, Inc., 1000 First St., Hayesville, N. C. Bulletin 556 is illustrated and contains a price and parts list.

1294—Lighting Fixtures

Ainsworth Lighting, Inc., 38-10 29th St., Long Island City 1, N. Y., has issued a new catalog illustrating their complete line of fluorescent and incandescent lighting fixtures for schools and offices.

1296—Engine Generators

Wincharger Corp., Sioux City, Iowa, has available a complete catalog on their Winco engine-driven generator plants. These units range from 300 watt d-c to 10,000 watt 60-cycle a-c.



PLP ARMOR-GRIP SUSPENSION UNITS — THE ULTIMATE IN CONDUCTOR PROTECTION

The PLP Armor-Grip Suspension Unit is an entirely new concept in transmission design. Unlike old style bolted clamps that exert concentrated clamping stresses, Preformed Armor-Grip Suspension Units cradle the conductor in neoprene. This protects the conductor, yet the Preformed AGSU Rod components firmly grip the conductor, distributing the tensile load throughout their length. With Preformed Armor-Grip Suspension Units there are no parts to loosen in vibration. Because of their smooth contour and large diameter, corona emission, radio influence and arc-over are minimized. These, plus easier installation, are some of the reasons why more Utilities are adopting this new type of suspension. Write for more information today. Dept. No. PR5A

PX-79

PLP Armor-Grip Suspension Units support these 132 KV Cleveland Electric Illuminating Company lines.

PREFORMED LINE PRODUCTS CO.

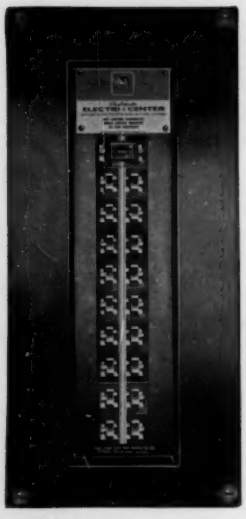
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

Telephone: Cleveland EXpress 1-3571

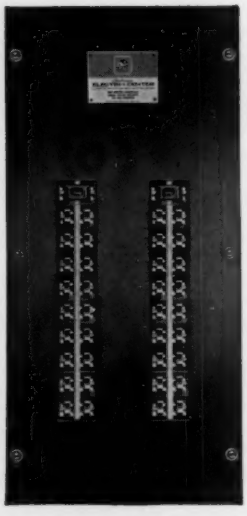
Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

Now! Over-all electrical protection—one main

A



B



C

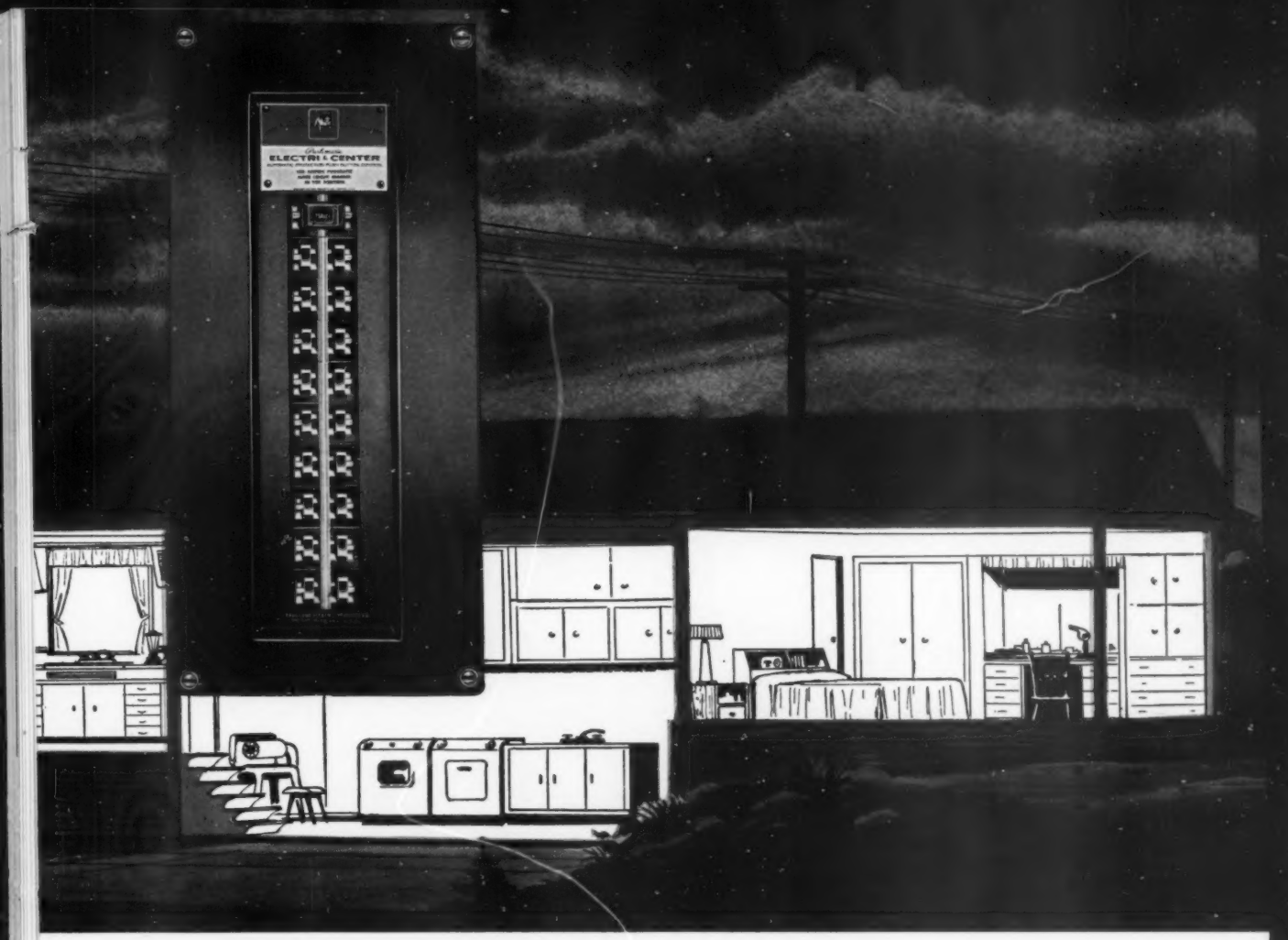
A. Single-row panels feature one factory-installed main disconnect... are available in capacities of 70 or 100 amps with space for 12 or 18 circuits.

B. Double-row panels feature two factory-installed 70- or 100-amp main disconnects for 140 or 200 amps capacity ... with space for 24 or 36 circuits.

C. Separate 70- or 100-amp enclosed Pushmatic main disconnects are used when the branch-circuit panel is located at any distance from the service entrance. (Figure "C" shown blown up for clarity.)

CONSULT THE FOLLOWING SOUTHERN REPRESENTATIVES

WILSON ELECTRICAL EQUIPMENT CO.
2930 Commerce St., P.O. Box 1725
Houston, Texas



disconnect for every 100 amps of service

New 70- and 100-amp Pushmatics bring Safer Electrical Living!

It's here . . . maximum protection for service entrance conductors! . . . maximum protection for all branch circuit wiring! . . . maximum protection for lamp and appliance cords!

This *over-all* protection for everything electrical in the home is made possible and *practical* with the new 70- and 100-amp Pushmatic circuit breakers. Here's why:

The new main disconnect breakers for every 100 amps of service prevent overloading of service conductors. The thermal bi-metal operation of Duo-Guard Pushmatics® prevents overloading of branch circuit wiring. The exclusive solenoid-magnetic operation of Pushmatics gives maximum protection against short circuits caused by faulty cords. Offer all this—plus push-button convenience. See your electrical distributor. © BEPCO

BullDog Electric Products Company, Detroit 32, Michigan • A Division of I-T-E Circuit Breaker Company • *Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada), Limited, 80 Claysen Rd., Toronto 15, Ontario.

IF IT'S NEW... IF IT'S DIFFERENT... IF IT'S BETTER... IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY

WILSON ELECTRICAL EQUIPMENT CO.
101 E. Maple St.
San Antonio, Texas

STANDARD ELECTRIC MFG. CO.
2401 Federal St., P.O. Box 1138
Dallas 1, Texas

WALKER ELECTRICAL CO., INC.
125 Bennett St., N.W., P.O. Box 8, Sta. D
Atlanta, Georgia

ROYAL ELECTRIC PACKAGING KEEPS PROFITS POPPIN'

Easier, faster handling means bigger portable cord profits for you with Royal's new corrugated "Handi-Pak" (250' spools, individually packaged) in Master cartons!

LOWER HANDLING COSTS! Now . . . you save time and trouble . . . new "Handi-Pak" Cartons speed spool handling on both receiving and shipping. Master cartons simplify your warehousing and multiple unit shipments, too!

EASIER STOCKING! New "eye-opening" carton identification makes shelf stocking faster, easier . . . promotes faster order processing, and rapid, accurate stock control.

GREATER CUSTOMER SATISFACTION! Busy contractors and dealers will appreciate the new "tuck type" tops — a Royal First for cord cartons — easy to open and close . . . eliminate messy cutting and tearing.

THRU WHOLESALERS

ORDER ROYAL ELECTRIC PORTABLE CORDS IN NEW HANDI-PAK CARTONS NOW!	
2 "Handi-Paks" (500') per Master Carton	4 "Handi-Paks" (1000') per Master Carton
Type S 18/2	Type SJ 18/2
Type S 16/2	Type SJ 18/3
Type SJ 18/4	Type SJ 16/2
Type SJ 16/3	Type SJO 18/2
Type SJ 16/4	Type SJO 18/3
Type SJO 18/4	Type SJO 16/2
Type SJO 16/3	
Type SJO 16/4	

ROYAL

ROYAL ELECTRIC CORPORATION

PAWTUCKET • RHODE ISLAND

AN IT&T ASSOCIATE

Manufacturers of **WIRE • CORD SETS • FUSES • WIRING DEVICES**

Announcing the new General Electric

WHITE MERCURY LAMP

YOU and your customers can use the new General Electric *White Mercury* Reflector Lamps *in existing 400-watt mercury equipment* with no change or added investment in operating equipment.

1 GET UP TO 63% MORE LIGHT ON WORK FROM PRESENT FIXTURES: Because a brand new phosphor generates more white light than ever before you get from 7% to 63% more light on the work, depending upon the lamp type being replaced. (See below).

2 GET UP TO 33% LOWER COST OF LIGHT IN EXISTING INSTALLATIONS: With this increased efficiency, unit cost of light can go down from 7% to 33% (See below)!

3 GET LOWER INITIAL COST FOR NEW INSTALLATIONS: You can get *more* light from the same number of fixtures, or get *equal* light with up to ⅓ *fewer* fixtures!

All this is possible with new General Electric *White Mercury* Reflector Lamps because of a specially designed strontium magnesium orthophosphate phosphor. This phosphor converts ultra-violet radiation into more white light than ever possible before. It's also an efficient reflector—sealed in against dirt and fumes.

You and your customers can gain these advantages *now* by replacing present mercury lamps with the new G-E H400 RW-1. Also available in the bulged tubular shape, the H400 EW-1. For more information write: General Electric Large Lamp Dept. ES-2, Nela Park, Cleveland 12, Ohio.

ADVANTAGES OF NEW G-E *WHITE MERCURY* OVER OTHER G-E 400-WATT MERCURY LAMPS

NEW RW-1 vs A-1 (clear glass)

- 55% to 63% more light to the work
- 27% to 33% lower cost of light
- Less maintenance
- Whiter "Color"

NEW RW-1 vs E-1 (clear glass)

- 28% to 31% more light to the work
- 16% to 23% lower cost of light
- Less maintenance
- Well suited for use in upward light fixtures
- Whiter "Color"

NEW RW-1 vs J1 (color improved)

- 37% to 40% more light on the work
- 24% to 30% lower cost of light
- Less color improvement

NEW RW-1 vs RC1 and R1 (reflector shape)

- About 7% more light on the work
- 7% lower cost of light
- Less color improvement for RC-1 users

Progress Is Our Most Important Product

GENERAL ELECTRIC

"CORDON" CIRCUIT BREAKERS

Widely accepted for high fault protection on low voltage applications

...4 frame sizes available for immediate delivery

Conceived and engineered at I-T-E. Recognizing the need for a practical and economical means to adequately protect low-voltage distribution circuits where very high fault currents are encountered, I-T-E engineers conceived and developed the first completely integrated current-limiting molded case circuit breaker. Named the "Cordon", this compact circuit breaker has an interrupting rating of 100,000 rms amperes.

Manufactured and tested by I-T-E. The "Cordon" combines all the design and operating advantages of standard I-T-E molded case circuit breakers with the proven high interrupting ability of current limiting Amp-Traps.* A prototype of this was developed, tested and retested until it met the rigid I-T-E standards. Then, and only then, was a complete line offered to industry. Four frame sizes are now available.

*Amp-Trap: T.M. Reg. The Chase-Shawmut Co.

Widespread acceptance. Now thousands of delivered "Cordon" circuit breakers prove industries' acceptance of this device and confirm I-T-E's belief in the need for it. More and more "Cordon" circuit breakers are being specified as the practical, economical answer for low voltage, high fault applications.

Learn more about this new concept in circuit protection. Contact the I-T-E sales office nearest you, or write for Bulletin 5042A.

I-T-E CIRCUIT BREAKER COMPANY • Small Air Circuit Breaker Division

19th & Hamilton Sts., Philadelphia 30, Pa.

225 amp CK frame

400 amp CKL frame

600 amp CL frame

100 amp CF frame

Engineers are now specifying these I-T-E Current-Limiting "Cordon" Circuit Breakers.

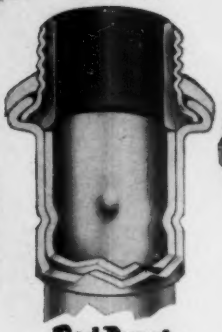
Immediate delivery can be made on all four frame sizes, for 600 v a-c and 250 v d-c service, 15 to 600 amperes.

I-T-E

B-M

the original concrete-tight **INDENTER FITTINGS** *for E.M.T.*

Red Throat Insulated Connector



Red Throat Cross section

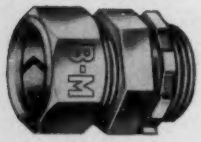
"BM" #100 Cutter for ½, ¾ and 1" E.M.T.

"BM" #1000 Holder for ½, ¾ and 1" E.M.T.

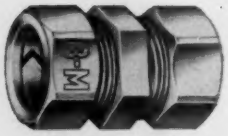
"BM" #607 ½" Indenter

"BM" #600 Changeable Jaw Indenter

Briegel Rain-Tight E.M.T. Compression Fittings



SIZES FROM ½" to 2"



SIZES FROM ½" to 2"

SIZES ½", ¾", 1"

SIZES ½", ¾", 1", 1¼"

Briegel Representatives from Coast to Coast

J. H. Akerman
813 Sistina Avenue
Coral Gables 46, Florida
Phone: Mohawk 7-3864

Harry C. Andrews Co.
5440 Gravois Avenue
St. Louis 16, Missouri
Phone: Hudson 1-7373

Crescent Electric Sales Co.
1800 N. Humboldt Blvd.
Chicago 47, Illinois
Phone: Albany 2-2600

R. L. Cunningham Electric Co.
843 South Front Street
Philadelphia 47, Pennsylvania
Phone: Lombard 3-3660 & 3-3109

L. J. Crews
1725 Arlington Road
Richmond 20, Virginia
Phone: 4-2273

Curtis Sales Corporation
3231 Warrenville Center Rd.
Shaker Heights 22, Ohio
Phone: Skyline 2-0225

Herbert L. Jones
745 Ohio River Blvd.
Pittsburgh 2, Pennsylvania
Phone: Linden 1-6684

Al Levin & Associates, Inc.
1200 So. Peters Street
New Orleans, Louisiana
Phone: Tulane 8480 & 8489

H. A. Maggiore & Son
15 Carleton Street
Cambridge 42, Mass.
Phone: Kirkland 7-4954

Ernst F. Hauch Co.
1282 Folsom Street
San Francisco 3, California
Phone: Hemlock 1-1828

R. C. Handy Sales Co.
4811 Excelsior Blvd.
Minneapolis, Minnesota
Phone: WAlnut 6-2939

L. D. Hood Sales
1133 West 8th Avenue
Denver, Colorado
Phone: Acoma 2-9001

A. Lee Clifford
1801 West 18th
Indianapolis 7, Indiana
Phone: Melrose 6-4449

Walter S. Nash
2101 Tula Street, N.W.
Atlanta, Georgia
Phone: Elgin 8071

Rutkin Electrical Sales Co.
935 Stanford Avenue
Los Angeles 21, California
Phone: Tucker 1224 & 5

Valkus-Kissel
1711 Kelly Street
Dallas 1, Texas
Phone: Hamilton 8-7388

W. W. Wheat & Son
2219 4th Avenue
Seattle 1, Washington
Phone: Seneca 6222

Arnold J. Young Co.
12600 Hamilton Avenue
Highland Park 3, Michigan
Phone: Townsend 9-5080 & 1

E. J. Martin Company
150 Nassau Street
New York 38, New York
Phone: Worth 4-6270

All B-M Indenter Fittings are U.L. Approved as concrete-tight and all Compression Fittings as rain-tight as well as for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

SOLD ONLY THROUGH ELECTRICAL WHOLESALERS

Specify Red "D" Portable Cord

with "built-in"..

PM

Diamond Type MD® heavy, medium and light duty flexible cordage . . . rubber insulated with rubber or neoprene jacket.

Maximum flexibility, moisture resistant. Conveniently marked-to-measure!

Diamond DTX® Non-Metallic WHITE Sheathed Cable. Non-sticking, smooth and easy to pull. Clean to handle, does not flake off!

PREVENTIVE MAINTENANCE gets top priority from industrial management . . . so when the job calls for an industrial application of Portable Cord, specify the product with "built-in" PM! Diamond Portable Cord and Red-D-Prene® assure the industrial user maximum protection against costly downtime caused by cord failures. The tough, oil and abrasion resistant sheaths give long wear, reduce maintenance costs. Red-D-Prene, first portable cord produced in Industrial Red, is readily identified . . . thus minimizing accidents.

Trade Mark ®

DIAMOND

WIRE and **CABLE** Company

Sycamore, Illinois

Unit-price charges for extras

Recent increase in speculative building of shopping centers and other multi-tenant occupancy buildings has resulted in more electrical contracts being let for a base job plus a unit-price basis for the specific wiring required by individual tenants. Here is a study of contractors' experience in this field.

By Carl W. Evans, Editor
Electrical South

◆ DURING THE PAST few years, with the great increase in speculative building of shopping centers, large office buildings and other structures for multi-tenant occupancy, the unit-price system of electrical contracting for "extras" on these jobs has become increasingly important. This usually calls for all added circuits in each individually leased space to be installed later at a flat rate of so much per outlet—and so much per item for other facilities specified.

The central electrical system, of course, is designed, bid, and installed in the usual way for the building owners. However, since the latter do not know in advance who their tenants will be, some provision has to be made for completing the individual lighting circuits in each separate space according to the tenant's needs—and with some kind of cost control.

In some cases, these individual store or office designs and installations are left to be negotiated solely by the sub-contractor and the tenants after the latter have taken over. Under some leases the owners pay for the electrical job, and under others the tenants pay or share the cost. In general, the building owners pay for the routine wiring and outlets around the perimeters of rooms of the leased space, and the tenants pay for special ceiling fixtures, for hanging them, and also for any other special extras they may desire. The size of the rental figure usually determines how much the owner will spend.

In any case, the owners wish to establish some basis of electrical cost in each store in order to help set a profitable lease figure relative to investment. Therefore most speculative builders and general contractors require that the electrical contractor, in order to win the big basic contract, also must make a flat-rate bid of so much per outlet for all extra installations to be put in later.

Helps owner and tenant

This figure, together with the nominal number of outlets in the tentative plan, also gives the tenant a pretty good idea of how much the owner is prepared to spend on the electrical job. Therefore the merchant knows that for any special facilities above this nominal amount, he will have to foot the bill himself. Thus unit prices help both owner and tenant to arrive at suitable lease figures and over-all costs. It gives them a basis for discussion, and when properly used eliminates some of the uncertainties all around.

Of course, the owners usually like the "unit" bids to be low because this tends to limit their future costs, and is also attractive to tenants in planning additional outlets. So a nominal per-outlet figure is usually advanced, even when it may be doubtful that units in all locations can be put in profitably at this rate.

Current trade opinions

The electrical trade feels that this unit-price system can be either good or bad, depending on how agreements are drawn up and how they are carried out. While the system seems to be a necessary evil, it *can* be successfully tackled by the alert and experienced contractor. For others, it often presents great difficulties and can result in losses or scant profits that whittle down the proceeds of the original job.

Some contractors report that by

taking adequate precautions, they make out all right on these deals. They say that they'd rather have a fair clean-cut unit-price, stated clearly with adequate safeguard clauses in the contract, than have to haggle later over which items are extras—and what the rates shall be for work in the "unfinished" parts of the buildings.

However, the majority of contractors interviewed, and especially those who haven't done enough of this work to gain full experience, regard unit-price jobs as headaches on which they often don't come out well, and which they take only to get the big central contracts. They see the extras as potential gambles which may put them at the mercy of builders and tenants, unless there is a detailed contract with specific provision for extra payment for extra labor and materials on above-average runs, special services, and additional equipment needed.

Basis for payment

For this reason, some contractors specify that under the unit system "extra" wiring be paid for at so much per foot for all runs of more than 15 feet from junction points to outlets, for all additional home runs to central panels, with extra pay for any added panels and for hanging of fixtures, etc. The opinion is that unit prices, when set at a minimum figure, should cover installation of *outlets* only, for there is wide variation in fixtures and in costs of hanging them. The fixture charge is sometimes the thing that gets the boys off the hook.

Other contracts specify a nominal figure, say $10 per outlet, but permit in one way or another complete renegotiation of the price on each space, as soon as the tenant takes over—this is especially true if the tenant's plans call for more than the minimum of facilities.

In some cases this leads to a dispute between the owner and tenant as to how much of the cost of an improved system each will pay. The settlement depends on the size of the rental figure, the desirability of the lease, and the prestige of the tenant. Contractors find it wise to stay out of these arguments and concentrate on satisfying the lessee, while insisting in advance on extra pay for extra work beyond the normal expectancy of unit-price jobs.

The system of direct negotiations with each tenant is regarded as far and away the most satisfactory by contractors, for they say it fits the price to the real cost in each case. It also gives each tenant an opportunity to plan his installation to meet his own long-term needs of both decor and service.

Some observers say that when a *firm* "unit price" is set rigidly in advance, sight unseen, it should be set high enough to cover all risks and unusual situations. This, they contend, often would not be fair to the tenant, and would be of little value to the owner in selling leases or controlling costs.

"Average" unit rates

As to "average" unit rates, estimators say that $20 an outlet is about right in urban areas, with costs on some individual outlets running to $35.

In actual practice, what happens in many cases is that a nominal per outlet price is put in the contract to please the owner. Safeguard clauses about exceptional costs *may* be included, according to how much "nerve" the contractor has, or how badly he wants the basic contract—but often there are no written safeguards. Then, when the spaces are rented, if the tenants' plans or the size of the space indicate extra costs, it is up to the contractor to convince them that if they get what they want, they will have to pay the difference. When he has the facts on his side, it is usually possible to "sell" them. Thus the flat per outlet price in the original contract is tacitly superceded by a specific plan covering actual needs.

On the other hand, if the contractor has fair sailing on a routine job, some owners will try to cut the unit price after the job is done. It is recommended that each store installation be approved in writing by the general superintendent as soon as it is finished. When disputes arise after walls and ceilings are up, it is hard to prove extra costs. Some few owners take advantage of this, it is alleged.

Alternate arrangements

Some firms which take these jobs at nominal per outlet prices, figure to lose on some and gain on others, hoping to hit a decent average profit including that on the central job. Other firms will not take these jobs on unfinished spaces except on a time and material basis. Still others like a contract that calls for a reasonable installation of an average number of outlets per 100 square feet, but specifies that the minute any changes are desired in this ratio, the contract covering that store is to be renegotiated on the basis of service desired.

One thing that helps contractors is that the large "prestige" stores in shopping centers generally have rented their space even before the building is put up, and their plans, including lighting and air-conditioning, are all drawn up before the electrical contract is signed. This gives the electrical sub-contractor a chance to figure his distances and costs before he bids, and he can protect himself accordingly. Also, by having a clear-cut agreement between the owner and tenant as to what facilities each will pay for, he gains further protection.

All bidders point out that it is a great benefit to them to work from a sound central design which provides a *reserve* of panel and subpanel capacity and sufficient feeder capacity to the store and office spaces. It not only costs the owner more to provide adequate service later, but it often adds to the contractor's cost by requiring him to do re-engineering, run additional home run circuits under unfavorable conditions, and dislocate other rush work.

Firms which like the unit-price system say that with a good design and a good clear contract covering extras, they know what to expect. They can figure the distances from stubbed-out circuits and junction boxes to service points and come out all right on an orthodox sub-installation. It works well on multi-home projects, where distances are short, needs routine, and costs easy to figure.

Those who have done a lot of unit work say they have worked out a unit-cost schedule for large and small buildings: so much, including labor, for wiring per ordinary outlet; so much per foot for longer runs, per switch, per incandescent fixture, per small and large slim-line unit, etc. This they simply present to the tenant and apply to his plan. He appreciates it because it enables him to know in advance pretty much what the job will cost, and he figures he's only paying the same rate as everybody else for the same services.

Successful unit-price deals

Examples of unit-price deals which were satisfactory all around: On a design to light an airport

landing field and machine shop approaches, an engineer set up the contract at so much per foot of laid cable, so much per outlet, per switch, per incandescent and fluorescent fixture of various sizes. They also furnished bidders with all individual and total distances in feet and the total number of other items. This eliminated most of the gamble in the contract and resulted in a good job on which every one knew what to expect.

For a shopping center with 20 stores, the designer set up a conventional plan for the central system, and then laid out sub circuits providing unit-price outlets on 10-foot centers all the way through each store space, with distribution complete to ceiling points. The contract then called for each tenant to negotiate directly with the contractor for anything he wanted in excess of this and for hanging the specific fixtures supplied by the tenant. Each merchant got what he wanted and paid according to what he got.

Most engineers and contractors figure that this sort of unit system, where all the distances are known and provided for, is more equitable than that of trying to apply a rigid rate to unknown and widely-varying conditions and needs.

Plus-or-minus system

Here is another situation in which unit prices help: with distances and costs pretty well known, a tenant is not yet sure exactly how many outlets he'll need. By setting a fair average flat rate, the contractor can permit the customer to add 10 lights or delete 5 from the plan, as his needs become clear. This permits needed flexibility without hurting any one. It also avoids the possibility of haggling over the cost of changes.

All three of these case histories are instances where unit prices were used to remove troublesome uncertainties, and this is considered the constructive use of the system.

One objection some contractors have to some of the large, very-complicated flat rate extra jobs is that it takes a lot of paper work by high priced estimators to keep track of all the items and figure up the bill without leaving anything out. Omissions can eat into profits.

Also the contractor has to be extra alert both in analyzing the original contract before signing and in applying it to each subspace. One of the common dangers is neglecting to specify that additional home runs to the panels, when needed later, shall be paid for by the foot. Otherwise it may be hard to collect for 100 feet of wiring. Additional home runs are often needed in big "centers" and buildings, because some one or two of the tenants may take more of the load than anticipated. Where insufficient panel space or capacity is provided, it can lead to a dispute over added costs.

Conclusions

One trade observer, summing up his conclusions, declared: "The most important single thing is for a contractor to sit right down with the general superintendent or tenant and iron out each troublesome point on costs as soon as he spots it, and by all means before any or very much of the work has been done. Also be sure to get a signed work order for a specific number of outlets, plus extra distance runs if any, when in doubt.

"Bear in mind that it's not the average small conventional space that will bite you, but the exceptional one with longer distances or more complicated lighting and equipment. If you don't know your builder very well, and can't be sure he is just putting the low unit prices in the contract for a "selling" point or for average conditions, insist on a safeguard clause providing for extra pay for runs over 15 feet and for other extra costs beyond normal expectancy. This is particularly true of big jobs with short deadlines, where last minute changes may be made and some circuits run after partitions are up."

Individual bugs, pointed out from actual job experience, include the following: there is often a conflict between the architect's plan and that of the tenant for lighting. Sometimes after partitions are up, it develops there are not enough outlets for the fixtures. These additional outlets and runs should be put in on a cost plus basis where difficulties develop.

In some cases as many as ten small fixtures may be fed from one outlet with a lot of wiring involved. In this situation, adequate payment should be specified—as the flat rate for one outlet will not cover the cost.

All in all, the trade consensus is that unit-price contracts are here to stay on most speculative buildings, because the owners need and want them. It is estimated that fully 25 per cent of contractors in cities are now doing some work under this system, and that more will come to it as time goes on. The opinion is that the trade might as well learn how to handle this problem and find out what bugs to look out for. It will give them added confidence in bidding this work.

Experienced bidders say: "Don't be so anxious to get that big basic contract that you buy a 'pig in a poke' on the extras without finding out what the builders really expect and what safeguards they will allow you in exceptional cases.

"Don't go ahead on any extras where it looks like you're heading into trouble without talking it over with the principals. You can be sure your complaints will carry less weight after the work is in. Get signed work orders where needed, and written approval of the finished job. When there is any doubt about the job, or there is to be a delay in the final accounting, have photos made before the building is sealed up showing the amount of work done in the leased space. These pictures may also be helpful later in selling other jobs."

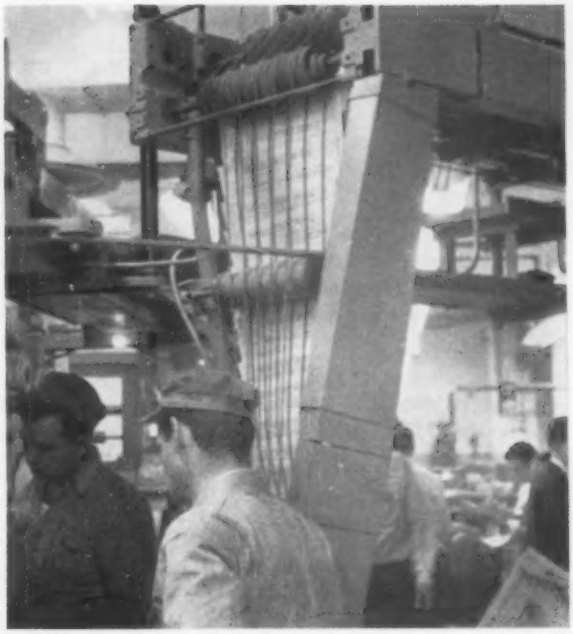
Electrical surveys aid plant expansion

◆ MANAGEMENT should base any expansion or extensive modification of industrial power distribution systems on a sound analysis obtained through an electrical survey.

This was the advice of William B. Rollins, chief electrical engineer, Anderson-Nichols and Co., Concord, N. H., whose paper, "Electrical Surveys for Industrial Plants," was given before a session on industrial power rectifiers during the recent Winter General Meeting of the American Institute of Electrical Engineers, in New York City.

The growing trend toward automation in most industries today, said Mr. Rollins, is making the expansion of industrial power systems necessary. The electrical survey is essential in convincing management of the need for expansion and is an invaluable aid to profit-

(Continued on page 102)



Some modern features introduced when Central Armature Works, Inc., Washington, D. C., was called in to electrically renovate an old three-story building for the Wall Street Journal were, left, wiring an old press for a complete bell and signal system with auxiliary standard and time-delay relays to comply with today's safety standards, and right, increasing illumination to 50-60 ft-c in mail room.

Renovating an electrical system economically

By Anthony P. Schmitt, Electrical Engineer, Central Armature Works, Inc., Washington, D. C.

◆ AN INTERESTING installation we have had recently was adjusting and bringing wornout electrical contacts on old printing presses to operate like new without spending excessively on replacing all push buttons and controls.

When the Wall Street Journal renovated an old three-story building to house its Washington branch and bought the promptly-available 27-year-old single color press of a Houston, Texas, newspaper to take care of increased circulation without delay, we were called in as electrical contractors on the job. The building itself was completely stripped electrically and no original electrical equipment was used. Cooperating with the general contractors, we worked from the consulting engineers' prepared plans, as a new building, new interior structurally and electrically were installed.

Service system

The old standard press had a 100hp main drive and 10hp (pilot) starter motor with four-reel units on the press. The main service comprised a 4000 ampere current transformer cabinet, two 1000 mainline circuit breakers for all lighting and power equipment, with switchgear for 13 branch feeders to eight lighting panels including the emergency and seven power panels. There was also a 600 ampere mainline circuit breaker for the press. New rollers and gears were installed, bearings refinished so that by replacing worn parts a tight working press was obtained.

We renovated all contacts on control boards, redipped and rebaked all motors including motor generator sets for d-c reel motors. Commutators were all checked and turned down. With the exception of the old press, all newspaper printing equipment, including trimmers, routers, flat dry mat, form scorchers, proof presses, Ludlows, paper lifts, mailing machines, linotypes and intertypes, was new.

After the main control board and press were completed, a very annoying chatter and hum resulted in the main contactor. This was eliminated by reducing the resistance in the dampening winding coiled around the pole pieces, evening up the laminations of the pole pieces, and reducing the tension on the holdback spring as the voltage was now 208 volts compared to its original design for 230 volts. For the press a complete bell and signal system with auxiliary standard and time-delay relays was interlocked with the old press controller to bring it up to today's safety standards.

A problem arose when molten

(Continued on page 103)

Economics of distribution systems

Many factors other than cost enter into the design of an electrical power distribution system for a specific industrial plant, but it is almost always necessary to know how much these other factors are changing the cost over and above the simplest possible design.

By Paul F. Larson, Holmes & Narver, Inc., Los Angeles, Calif.

◆ THE ELECTRICAL ENGINEER will be among the first to recognize that there are many factors other than economics which he must consider in designing an industrial power distribution system. The system must be adequate for its intended purpose both now and in the future. Safety of personnel and plant facilities are of paramount importance. Other factors to be considered include simplicity, service continuity, flexibility, regulation, efficiency, operation and maitenance.

The simple system not only costs less to build than a more complex one; it also is usually easier to maintain. This, in turn, can contribute to service continuity. A power system must provide a reasonable degree of continuity of service or it is no bargain. The wasted man-hours and lost production which can result from power interruptions may cost thousands of dollars. Any industrial power distribution system should have reasonable provisions to permit changes in plant layout or operating plans. Permissible variation of voltage may be greater or less than normal. Each of these design considerations affects the investment required by the power system.

The relationship between economic considerations and all of the other factors involved are things which the engineer must study as a part of his professional responsibility.

There are many simple relationships between service requirements and construction cost that are well known and generally accepted. For instance:

1. The radial distribution system is usually the most economical for industrial plants. Often it will provide the required service continuity with no sacrifice to safety or simplicity.

2. Primary and utilization voltages selected will affect system costs.

3. Size and location of power load centers will affect system costs.

There are, however, many design considerations in which the effects upon total construction cost is much less evident.

And the owner usually wants, expects, and is entitled to an answer to the questions. "What type of power distribution system shall I use? How much will it cost?"

This discussion was presented at a recent meeting of the American Institute of Electrical Engineers, and is reproduced here by special permission.

Evaluating relative costs

In order to evaluate the relative economics of various industrial plant distribution systems, the following steps are necessary:

1. Determine the magnitude and location of loads to be served.
2. Determine the primary voltage.
3. Determine secondary utilization voltages.
4. Determine preferred and alternate transformer capacities and locations.
5. Prepare preliminary single lines and plans of systems to be considered.
6. Determine estimates of the installed cost of system components, such as primary service switchgear, primary disconnect or selector switches, primary distribution switchgear, primary feeders, transformers, main secondary breakers, and differences between secondary feeders to load centers.

Cost estimating charts

The following unit cost charts (Figures 1 through 3) may be helpful in preparing preliminary plans and estimating construction costs.

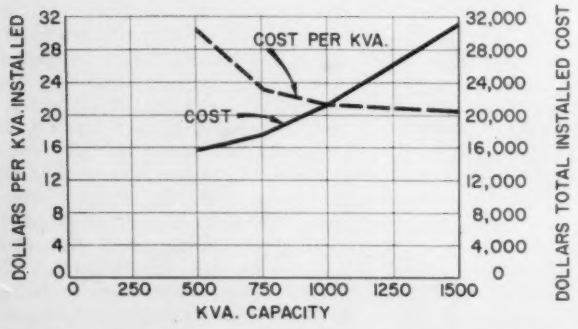


Fig. 1—Total cost and unit cost per kva of installed power load centers in industrial plants.

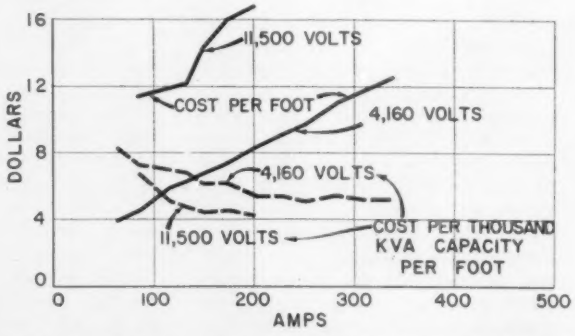


Fig. 2—Costs per foot of installed primary feeders of various capacities in industrial plants.

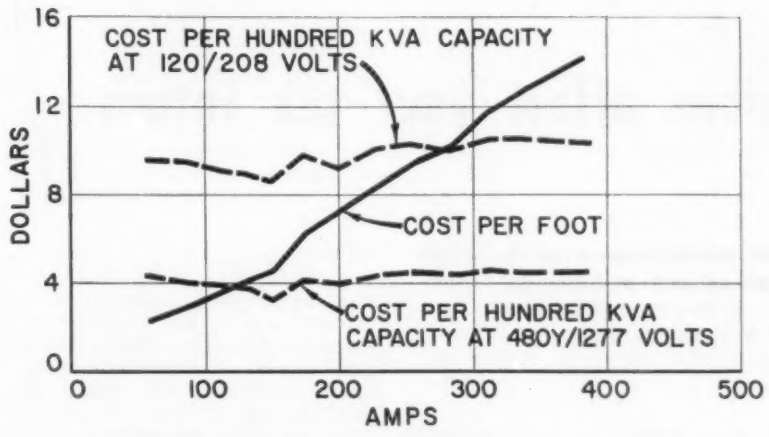


Fig. 3—Costs per foot and per hundred kva capacity for secondary feeders at various voltages installed in industrial plants.

All of these are based on total current installed costs in January, 1956 including material, labor and contractors' overhead and profit.

Figure 1 shows the total installed cost for power load centers consisting of unfused primary disconnect switch, 11.5 kv to 277Y/480 volt transformer, and main secondary breaker for transformers of various capacities, as well as the total installed cost per kva.

Figure 2 shows the total installed cost per foot and per thousand kva capacity per foot for 11,500 volt and 4,160 volt primary feeders. Costs are based on three rubber insulated shielded single conductors in rigid conduit. Current carrying capacities and conduit sizes are based on the 1953 National Electrical Code.

Figure 3 shows the total installed cost per foot and per hundred kva capacity per foot for 277Y/480 volt and 120/208 volt secondary feeders. Costs are based on four RHRW single conductors installed in rigid conduit in accordance with the National Electrical Code.

Tables I and II attached tabulate the results of such preliminary planning and economic analysis for a typical industrial plant of approximately 1,000,000 square feet.

Study of Figures 1 through 3 and Tables I and II reveal many interesting relationships between design considerations and construction costs. It should be kept in mind that although the principles will be true in general, the estimated cost shown in Table II apply only to the particular plant. It should also be noted, that % figures of system cost refer only to the portion of the system which was considered in the analysis and do not include the cost of complete secondary distribution.

Transformer costs approximate 27-50% of the system, ($14.30 to $17.40 per kva). These can be kept down by sizing transformers in the most economical range (saving $5-10 per kva), by chosing proper primary voltage (saving $2 per kva). Good maintenance of lighting may reduce transformer costs by $2 to $3 per kva.

Primary feeder costs approximate 10-16% of the system, ($3.40 to $10.00 per kva). These can be kept down by locating the transformers properly (saving $1.45 per kva), by using radial rather than loop (saving $4 per kva), by choosing the proper primary voltage (saving $1.16 per kva), and by sizing conductors in the most economical range.

Main secondary breaker costs approximate 7-14% of the system, ($4.15 to $4.65 per kva). Sizing transformers in the most economical range can save $0.27 to $0.50 and up per kva. Combining lighting and power on 277Y/480

(Continued on page 102)

Table I. Preliminary Estimated Electrical Construction Cost Apportionment

1,000,000-SQUARE-FOOT INDUSTRIAL PLANT
January 1956

SYSTEM COMPONENTS	PERCENTAGE OF TOTAL COST FOR VARIOUS SYSTEM COMPONENT			
	12,050 Kva Basic Loop Primary, Truss-mounted Transformer, 11.5 Kv	12,550 Kva Alternative 1 Floor-mounted Transformer. Otherwise similar to Basic	12,050 Kva Alternative 2 Radial Primary, Truss-mounted Transformer, 11.5 Kv	11,300 Kva Alternative 3 Radial Primary, Truss-mounted Transformer, 4.16 Kv
1. Service Circuit Breakers	3.8	2.9	5.8	8.6
2. Primary Loop Feeder or Radial Feeders	16.4	15.0	9.9	13.9
3. Primary Loop Circuit Breakers or Main Fused Switchgear	22.9	27.2	5.2	4.1
4. Primary Fused Selector Switches or Disconnect Switches	9.2	10.9	6.9	5.3
5. Transformers	32.7	26.9	49.6	43.8
6. Main Secondary Breakers	8.0	7.0	12.0	13.6
7. Floor Area for Substation	5.0	7.3	7.6	7.3
8. Excess Secondary to Load Centers	2.0	2.8	3.0	3.4
TOTALS	100.0	100.0	100.0	100.0

Table II. Preliminary Estimated Electrical Construction Costs

1,000,000 SQUARE FOOT INDUSTRIAL PLANT
January 1956

SYSTEM COMPONENTS	TOTAL INSTALLED COST			
	12,050 Kva Basic (Loop Primary, Truss-mounted Transformer, 11.5 Kv)	12,550 Kva Alternative 1 Floor-mounted Transformer. Otherwise similar to Basic	12,050 Kva Alternative 2 Radial Primary, Truss-mounted Transformer, 11.5 Kv	11,300 Kva Alternative 3 Radial Primary, Truss-mounted Transformer, 4.16 Kv
1. Service Circuit Breakers	$ 24,000	$ 24,000	$ 24,000	$ 32,000
2. Primary Loop Feeder or Radial Feeders	103,000	125,700	41,000	51,500
3. Primary Loop Circuit Breakers or Main Fused Switchgear	144,000	228,000	21,600	15,200
4. Primary Fused Selector Switches or Disconnect Switches	57,600	91,300	28,800	19,800
5. Transformers	206,000	225,500	206,000	162,000
6. Main Secondary Breakers	50,000	58,400	50,000	50,000
7. Floor Area for Substation	31,700	61,500	31,700	27,000
8. Excess Secondary to Load Centers	12,600	23,900	12,600	12,600
TOTALS	$628,900 (170 per cent)	$838,300 (226 per cent)	$415,700 (112 per cent)	$370,100 (100 per cent)

Business decisions affect your tax return

This informative article is based on information supplied by the American Institute of Accountants, the national professional organization of certified public accountants. It has been checked for technical accuracy, also, by the Internal Revenue Service.

◆ LONG-RANGE TAX planning in today's business world of high tax rates is no longer "big business foolishness." Last-minute tax worrying with no year-around tax thinking can result in the loss of sizeable savings for small and medium-sized businesses when it comes time to file a tax return.

For example, assume that last summer you were forced to replace your air conditioner. You shopped around and found you could either sell your old unit to a private party for $500, or a dealer in town would give you a trade-in allowance of $500 on it. That seemed like six-of-one-half-a-dozen-of-another to you; so without thinking—or worrying—about tax matters you traded in the old air conditioner.

To prove how such a seemingly simple business decision such as this can affect how much tax you will have to pay, let's assume further that the air conditioner which you traded had originally cost $2500 and that you had taken $1000 in depreciation on it. This meant its cost for tax purposes was $1500, and you were going to "lose" $1000 whether you accepted the dealer's trade-in allowance of $500 or sold to the private party for $500.

So far still six-of-one-half-a-dozen-of-another, but now since you elected to trade-in your old air conditioner, let's see how you can claim a deduction on a tax return for your $1000 loss. The answer is simple. You can't. All you can do is add the amount of the loss to the cost of your new unit, and eventually receive tax credit for your loss in the form of slightly higher depreciation deductions.

On the other hand, if you had made a bona fide sale of your old unit to the private party and a separate purchase of a new unit from a dealer, you would have established a $1000 loss which could be claimed as a loss deduction on a tax return and used to offset regular income.

Sell or trade-in?

It is not always true, of course, that a loss deduction on the tax return is worth two in the bush of depreciation, but a general rule to consider wnen you are trying to decide whether it would be more advantageous taxwise for you to sell or trade-in an asset is: sell "loss" property to obtain a deduction, and trade "profit" property to avoid the tax which must be paid on any profit realized from the sale of an asset.

You may find that you have sold yourself into a capital gains tax or traded yourself out of a loss deduction if you have not figured your depreciated costs correctly. This is a matter you should discuss with a certified public accountant. Not only can he verify the accuracy of your mathematical computations, but he can also explain the advantages and disadvantages of the various methods used to compute depreciation. It could be that the method you used or are using is not the one most suited to your business needs from a tax standpoint.

For example, if you ask a CPA whether you should use the straight-line or declining balance method to depreciate your new air conditioner, one of the first questions he might ask you would be: what are your cash requirements and what are your profits likely to be? If you are thinking of expanding and need additional cash within the next few years, he might recommend that you use the "new" declining balance method to compute depreciation.

The declining balance method "speeds up" or increases depreciation rates. This starts the chain reaction to your objective of retaining cash in the business, because when you increase depreciation rates you also increase allowable depreciation deductions on your tax return. The amount you may write-off the first year is twice what it would be if you used the straight-line method; so by applying a $1000 instead of $500 depreciation deduction against your regular income, you are going to reduce your taxes, and cash that does not have to be paid out in federal taxes can be retained in the business for expansion purposes.

Figuring depreciation

It seems all good things eventually come to an end, however, and while in the first year the declining balance depreciation rate may be double that of the straight-line, this differential diminishes in succeeding years until declining balance deductions are even less than they would be under the straight-line method. This is why it is important that you consider current and future earnings before you select a depreciation method.

For example, if your current earnings are low, or if you are expanding your services and the results of this expansion will take a few years to show in your earnings, it might be more advantageous taxwise for you to use the straight-line method of computating depreciation.

The straight-line method does not "speed up" depreciation deductions. It spreads them out equally over the estimated useful life of the asset; so when you use a straight-line method you are saving, in a sense, for a rainy day. When your earnings improve or increase, you will have more substantial depreciation deductions to apply against those earnings. There usually is no point in increasing a loss or reducing low earnings by claiming additional depreciation deductions when you do not need them.

A point to remember when you are trying to decide whether to buy new or used equipment is that second-hand equipment *must* be depreciated by the straight-line method. This tax factor should be considered, because loss of the opportunity to use the declining balance method with its rapid write-off feature may cancel any immediate savings effected by the purchase of used equipment.

Tax rate differences

The matter may have been decided and forgotten many years ago, but a basic question businessmen should consider from time to time—and one which has many tax implications—is whether to do business as a proprietorship, partnership, or corporation. There may be personal or professional factors that force the selection and maintenance of a non-corporate form of organization, but depending on the earnings of the business and the amount of those earnings you may need to withdraw, there are certain tax advantages to be gained by incorporating a new or expanding company.

Since proprietorship and partnership income is taxed at individual rates, which range anywhere from 20 per cent to 91 per cent, and corporation earnings are taxed at corporate rates of 30 per cent on the first $25,000 earned during the year and 52 per cent on the excess, it might appear that if you have relatively low income the proprietorship - partnership rates are lower. However, you must also consider that the corporate tax carries with it the privilege of deducting a reasonable salary paid to an employee-owner. The employee-owner has to pay a personal tax on his salary, of course, but if he were not incorporated, he would have to pay a personal tax on all the money earned by the business.

If the retained earnings of the company are taxed at a corporate rate which is lower than what the personal tax rate would be, the employee-owner would benefit by having additional funds available in the corporation for expansion purposes. These funds may be accumulated in a corporation up to $60,000 without further tax penalties, and even higher if the corporation can prove a need for them.

These advantages—while they may cut your current tax bill and increase working capital for expansion needs—can be lost if you have jumped into a corporation without first reviewing your own long-range cash requirements. If you are continually forced to withdraw money from the corporate earnings to pay personal expenses, you will have to withdraw these funds in the form of dividends. That means the corporation will have to pay tax on the earnings you are withdrawing as dividends, and you will have to pay tax on the dividends received. The "double tax" on earnings and dividends can nullify any tax advantage from incorporation when earnings must be withdrawn immediately as dividends.

Many businessmen seek professional advice about tax matters as they do professional assistance with their golf game—when the slice has become almost unbearable. You can save tax dollars by realizing that business decisions made in the fall affect the amount of tax you must pay in the spring. Practice year-round tax thinking, and consult a certified public accountant when you are in doubt as to the tax effect of even the most routine business decision.

High frequency for fluorescent lighting

◆ THE OPERATION of fluorescent lighting from a high frequency power source was the subject of several papers presented before a session on Production and Application of Light during the Winter General Meeting of the American Institute of Electrical Engineers held recently, in New York City.

R. D. Burnham, of the Wakefield Company, Vermillion, Ohio, reported that 840 cycle frequency was installed in a small industrial office building at lower initial cost, increased efficiency, greater flexibility, and a 20 per cent power consumption reduction over a comparable 60 cycle system.

"The air conditioning load was reduced ten per cent," he said, "and if lamp life proves to be longer it will also reduce the cost of operation."

Frequency conversion from 60 to 840 cycles was effected by utilizing a motor generator, instead of a static harmonic multiplier or an electronic multiplier, because of the lower initial cost, he said. A 400 volt, three-phase motor was used to drive an 840 cycle, 400 volt, three-phase generator. Capacitors were used for current limiting.

At the conclusion of his paper, "840 Cycle Fluorescent Lighting," Mr. Burnham observed that:

"Increasing frequency for the purpose of operating fluorescent lamps under more advantageous conditions seems to be practical with electrical components available today.

"It would appear from this pilot installation that a high frequency system boasting of increased lamp efficiency and lamp life, reduced radio interference, elimination of stroboscopic effect, removal of ballast noise, reduction in number and size of lighting fixtures could be installed for the same over-all cost as the usual 118 volt, 60 cycle system. Under favorable conditions it has been estimated high frequency lighting can reduce the electrical contract by ten to fifteen per cent.

"It is interesting to note that the electroluminescent luminous panel light source increases in brightness both with an increase in frequency and voltage. It is probable that when this new light source becomes practical for general use, it will be used first on a high voltage, high frequency distribution system.

"This is a relatively uncharted field, improvements in circuit design and electrical components are bound to be found which will lead to new techniques and advances along this line, but even at the present time, high frequency fluorescent lighting has the appearance of the proverbial 'better mouse trap'."

Industries contemplating installation of high frequency distribu-

(Continued on page 101)

Arkansas' most talked about house

A joint promotion of Arkansas Power and Light Co., a popular home-making magazine, and builders, furnishers, and decorators, has resulted in a model all-electric home so complete in its electrical features that the thousands who've seen and read about it are enraptured with this "luxury-equipped house built on a modest budget."

By Robert Wimberley, Manager, Adv. & Sales Prom., Arkansas Power and Light Co., Little Rock, Ark.

◆ "WHEN I WAS approached by *Living For Young Homemakers* to design the Electri-Living home for the Little Rock area, my first thought was of the sort of house I would want for my own family. I owned a lot. I was prepared to build a home, so this seemed the perfect opportunity to present my ideas of the ideal home for today's living. . . and then be able to live in it and test those ideas." Thus does K.E.N. Cole, Jr., Little Rock architect, explain how he happened to design an all-electric home for his own family. It was quite by accident that he met Miss Caroline Coolidge, one of *Living's* editors, at the National Home Builders Exposition, in Chicago. Caroline, having come from Helena, Arkansas, was chatting with Arkansas builders attending the convention.

Joint promotion

She and Architect Cole developed a casual conversation into Arkansas' most talked-about house. Cole told Miss Coolidge of his plans for a new home. Editor Coolidge informed Cole of her magazine's idea to feature "Electri-Living" home plans in the September, 1956, issue, then use pictures of the completed houses in January, 1957. She explained that it would be a joint venture with electric companies, builders, furnishers and decorators, and the many suppliers of the home building industry.

Some few weeks later Cole, Miss Coolidge, and the Executive Secretary of the Arkansas Home Builders Association, Mrs. Judy Disoghn, met with W. M. Shepherd, Arkansas Power & Light Company vice-president in charge of sales and development. This get-together gave birth to a home so complete in its electrical features that thousands of Arkansas persons who've seen it, plus unnumbered thousands who've read about it, are still enraptured with this "luxury-equipped house built on a modest budget."

Completed for around $20,000 (excluding lot) the home has 1463 square feet of living area, another 1000 square feet of carport, patio and sidewalks. Home and Garden Editor Mildred Woods of Little Rock's *Arkansas Gazette* says the home reflects an "intensely personal expression" since Architect Cole designed it for his family (three boys) while meeting the requirements as to cost, design, suitability to region and climate, utilization of new materials and electric servants. All of these items were checked by a board of architects, whose approval was necessary before the home became one of 23 from coast-to-coast to be sponsored by the magazine. If Cole's design is rated the best one, he gets a trip to South America. If builder Paul Spikes' promotion of the house is judged tops, he goes to the International Home Builders Exposition in Belgium. Both trips are at the magazine's expense.

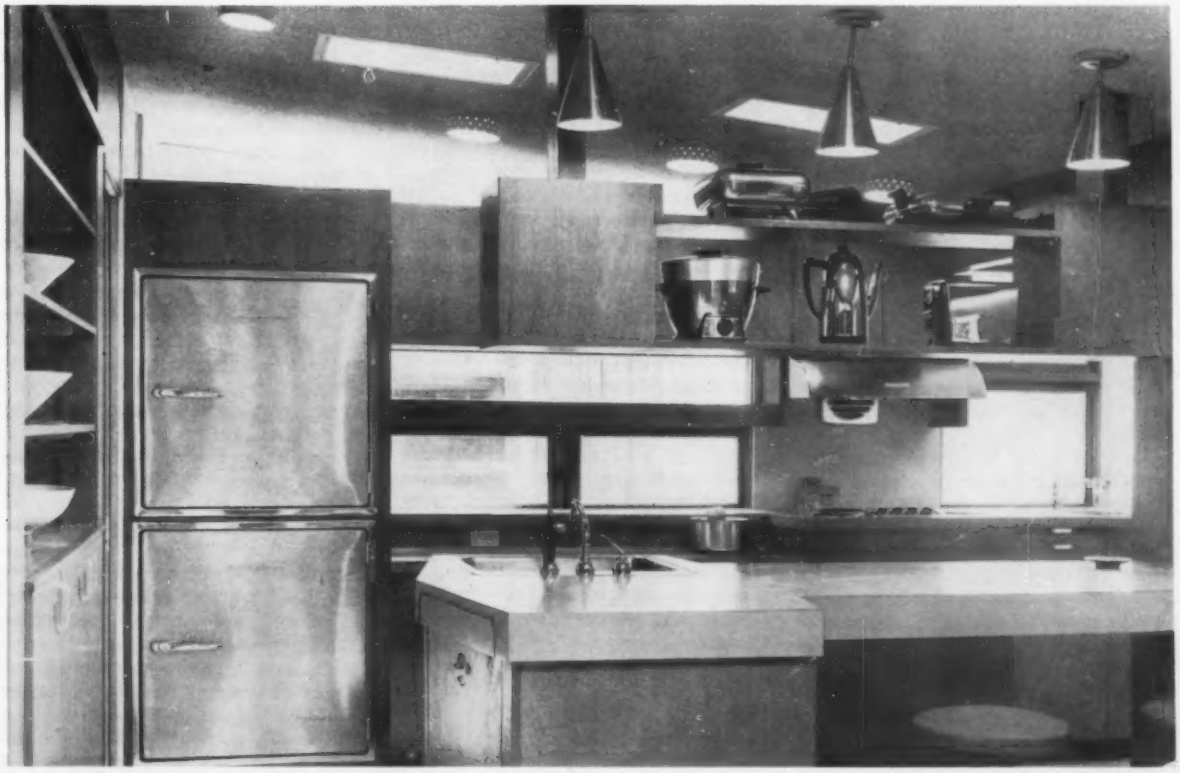
Arkansas Power & Light's part of the agreement was two-fold: first, to contribute $1500 toward construction, this amount to pay, in part, for the installation of the heat pump, light-conditioning, full housepower, and electrical "extras;" second, to coordinate the publicity and sales promotion.

Basic features

These basic features make the home "a house of tomorrow built for living today—electrically:"

(Continued on page 99)

Little Rock Architect K.E.N. Cole, Jr., center, points out features of Electri-Living Home to Evelyn Ellman, TV moderator, and Caroline Coolidge, midwest editor, LIVING magazine, on one of 28 TV interviews which built interest in display home. At right, master bedroom has pull-down fixtures.



Biggest worksaver is the electric kitchen. An "appliance center" provides convenient "roll up" plugs and five separate circuits. Control box is built into storage rack suspended from ceiling.

Emergency lighting

Lighting of exits, exit signs, and exit approaches is an essential feature of the Building Exits Code, which this year has been revised to provide specific answers for some of the troublesome questions of emergency lighting practice.

By Robert S. Moulton, Technical Secretary, National Fire Protection Association, Boston, Mass.

◆ UNEXPECTED DARKNESS is disturbing at any time, and in time of danger, real or imagined, it is conducive to panic. Failure of lighting has been a major contributing factor in many of the notorious fires of the past 50 years where major loss of life has occurred.

The Iroquois Theatre fire in Chicago, December 30, 1903, where 602 lives were lost was an example where failure of lights contributed to the panic which greatly aggravated an already dangerous situation. The Cocoanut Grove Night Club fire in Boston, November 28, 1942, with a death toll of 492 was another notorious example. The record continues right into the present; eleven lives were lost when lights failed in the Baltimore Oyster Roast fire in January of this year. In these and many other fires loss of life might have occurred even if full illumination had been maintained, but the conclusion is inescapable that panic and resultant loss of life was greatly aggravated in darkness.

Even when there is no fire, and no smoke to cause alarm, failure of lights is disturbing, and sets the stage for panic in any place where any large number of people are crowded together. And the promiscuous lighting of matches by excited people trying to find their way out may start a fire.

Lighting of exits, exit signs, and paths of travel to exits is an essential feature of the Building Exits Code, the standard of the National Fire Protection Association on exits and related features of life safety from fire and other emergencies requiring evacuation of buildings in the interest of public safety. The NFPA Committee on Safety to Life, which drafts the Building Exits Code, has since organization in 1913 operated on the premise that exits alone cannot assure life safety from fire or other emergency; there must be enough lights so that people can find the exits, and see to use them safely.

Public utility electric systems have a high degree of reliability, and provide a satisfactory source for exit lighting for the great majority of buildings. The fact remains, however, that even the most reliable of public utility systems may suffer interruption of service due to hurricanes, floods, earthquakes, breakdowns of electrical equipment or acts of sabotage. Furthermore, even though there is no interruption of the public utility service, lights may and often do fail due to electrical faults within the individual building, or due to human error in operating the wrong switch.

The worst situation is when a fire which threatens the lives of building occupants causes failure of the lighting system before they have time to escape. The probability of such occurrences, while mathematically slight, is such as to call for some type of emergency lighting system to assure continuing illumination sufficient for the safe evacuation of the building in theatres, and other places where large numbers of people congregate.

How the Codes apply

Building Codes and other public safety regulations have for years specified emergency lighting facilities for theatres, and similar requirements have been extended to night clubs since the Cocoanut Grove fire.

The National Electrical Code, as developed by the National Fire Protection Association and widely used as a basis of legal requirements, has described acceptable ways of providing emergency lighting, but has not attempted to differentiate between the various methods, or to spell out the conditions where emergency lighting facilities are essential in the interest of public safety. There are good and sufficient reasons why the National Electrical Code stops where it does.

The Building Exits Code has previously furnished some general guidance as to where and how emergency lighting should be provided, but the wide differences in application of these principles in different jurisdictions have indicated the need for more specific guidance, and this year the Building Exits Code has just been revised to provide specific answers for some of the troublesome questions of emergency lighting practice.

Distinction should be made between emergency exit lighting, and general lighting. The Building Exits Code covers only exit lighting, including exits and ways of approach to exits, and lighting for exit signs. While the Building Exits Code does not cover general lighting, its requirements are such as to assure enough light to provide for safe travel to reach exits and thus provides for public safety, as a relatively low level of general illumination should suffice to minimize danger of panic.

Emergency lighting sufficient to maintain the normal functions of occupancy, such for example as in hospital operating rooms, is quite another matter. The principles, however, are much the same. Emergency electric supply to continue iron lungs in operation in the event of general power failure, or to maintain critical industrial equipment in operation likewise involves similar principles, but is outside of the scope of this paper.

Before discussing the lighting

This article was prepared from a Conference Paper presented before a recent meeting of the American Institute of Electrical Engineers.

for fire safety

provisions of the current Building Exits Code, it may be well to consider some of the fundamentals which have often not been fully understood. In the first place, it should be noted that like any type of emergency equipment, a certain degree of attention and maintenance is necessary to assure reliable operation; and that human nature being what it is, the equipment is likely to be found wanting when needed unless regular maintenance procedures are part of someone's paid job.

Different methods vary in the amount of maintenance attention needed; the less the degree of attention needed, the greater the reliability. An emergency system depending upon dry cell batteries might be satisfactory if batteries were replaced after every operation of the lights and in any case at specified intervals. It is not to be presumed however that the average system will receive this degree of attention, and dry cell batteries are accordingly not recognized as a source of energy for emergency lighting of exits.

Power sources for exits

A gasoline engine driven or water motor driven generator is a satisfactory source of emergency power for exit lighting; if maintained ready for instant starting, if fully automatic, and if it can reach its operating speed promptly enough so as to avoid any appreciable interval of darkness—conditions which are seldom met in actual practice. A standby generator, on the other hand, may be fully satisfactory to take the load in an occupancy such as a hospital where continuous service must be maintained in the event of general power failure such as in a hurricane or flood. In such cases, a slight delay in putting the emergency generator in operation may not necessarily have serious consequences.

Emergency lighting equipment that comes into operation automatically upon failure of the normal lighting may also come into operation when the building is closed for the night and the lights are turned off. If battery supplied, this means that the batteries may be depleted.

In any case continued operation of lights in a closed building is likely to cause concern and result in some action to turn them off, with the consequence that the emergency equipment may be inoperative the next time the building is occupied. Thus, the automatic equipment should be able to distinguish between a power failure, and normal opening of lighting circuits.

An acceptable alternative is an arrangement whereby the auxiliary emergency lighting will continue in operation for the specified period, usually half an hour, and then turn itself off, ready for repeated automatic operation when the building is again occupied and the lights turned on.

One further thought is that electricity, while the principal source of artificial illumination, is not the only source.

The 1956 Building Exits Code classifies emergency exit lighting in three groups, A, B, and C, each suitable for different situations, but without any indication of relative superiority, as follows:

Class A emergency lighting

5231. Class A emergency lighting shall be so arranged as to provide the required illumination automatically in the event of any failure of normal lighting due to any fault in the main lighting system, due to any failure of public utility or other outside electric power supply, or any single manual act such as accidental opening of a switch controlling normal lighting facilities.

5232. Class A emergency lighting shall be either continuously in operation, or shall be capable of repeated automatic operation without manual intervention. Where maintenance of illumination depends upon changing from one energy source to another, there shall be no appreciable interruption of illumination during the change over.

5233. Class A emergency lighting, subject to the approval of the enforcing authority, may be provided by any method or combination of methods which will produce the desired results, such as:

(1) Two separate electric lighting systems, with independent wiring, each adequate alone to provide the specified exit lighting, one supplied from an outside source such as a public utility service and the other from an electric generator on the premises driven by an independent source of power, both sources of illumination being in regular simultaneous operation whenever the building is occupied during periods of darkness.

(2) An electric circuit or circuits used only for exit illumination, with two independent electric sources so arranged that on the failure of one the other will come automatically and immediately into operation. One such source shall be a connection from a public utility or similar outside power source and the other an approved storage battery with suitable provision to keep it automatically charged. Such battery shall also be so provided with automatic controls that after the battery comes into operation due to failure of the primary power source, or due to turning off the primary electric source for the exit lights, it will be shut off after its specified period of operation and will be automatically recharged and ready for further service when the primary current source is again turned on.

(3) Unit devices with individual batteries providing for the same functions as specified in item (2) above, except that the battery supplied light may be operated on a separate circuit at a voltage different from that of the primary light.

(4) Two separate sources of illumination, one electric and the other of the incandescent gas mantle type, supplied by city gas, propane or gasoline vapor, utilizing only approved gas lighting devices and with reliable arrangements acceptable to the enforcing authority to assure that both gas and electric lighting sources will be in regular continuous operation during occupancy of the building in periods of darkness. Such gas lighting devices shall be so install-

(Continued on page 98)

Personal contact sells more electric heat

While newspaper promotion serves to identify this Virginia firm's name with electric heating, the real clincher ultimately is a visit to a completed job and discussion with a satisfied owner.

By Fred W. Early, General Manager, Midway Electric Co., Charlottesville, Va.

◆ WE HAVE BEEN promoting radiant electric heating the year round. We have had a full-time salesman contacting prospects daily for radiant heat installations in the entire house or any part of it. In other words, our area has been enthusiastic about electric heating and has spread the word around that it is healthful, economical, more comfortable, cleaner, space saving, and more attractive looking.

Installations on new construction and in supplementary heating in bathrooms, bedrooms, converted basement garages, playrooms, as well as in entire homes, were proceeding at an increasing number annually reaching a peak of 40 installations until the recent rise in electric rates.

We have found personal contact the best means of selling electric heat. Obtaining leads through city building permits, we have our outside salesman call on the builder, architect, or homeowner, and talk electric heating. The best opportunities present themselves on homes where price is *not* the primary consideration. Where some interest is shown by the prospect, we take them around to a completed job or job in progress. When radiant heat is accepted, we recommend insulation in accordance with manufacturer's specifications: ceiling insulation 6-inches, wall insulation 4-inches, and underfloor insulation 2-inches.

Personal contact is best supplemented by taking the prospect to an electrically heated home where a satisfied customer willingly discusses benefits and costs. For ex-

At top, a thermostat regulates radiant heat that has been installed in the ceiling of this residence in Charlottesville, Va., by Midway Electric Co. Below, radiant glass panels have found widespread favor in the area. These sales were completed after prospects were shown similar installations in operation.

Sell the Complete CEILHEAT Line
Build Business...Boost Profits

NEW CEILHEAT PORTABLE HEATERS

NEW PORTABLE HEATERS

Latest addition to the Ceilheat electric heating line are handsome, efficient portable space heaters. 240-volt heaters are made in two, three, four and five element designs available in seven models with capacity from 2000 watts to 4800 watts. 208-volt heaters in two, three and four element designs range from 2000 to 4000 watts. Order from your Ceilheat distributor now. Write for free literature.

WRITE FOR FULL DETAILS

ARISTOCRAT
for plastered ceilings

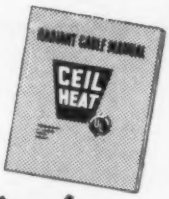
DRI-CEIL
for dry-wall use

AJAX
for concrete floors

DUCEL
- All purpose cable

ENGINEERED RADIANT CABLE

Ceilheat's long experience as a pioneer in electric radiant cable produced the full line of cables engineered for every construction method. Available for use in concrete floors, plaster ceilings or dry-wall construction. Write for free literature.



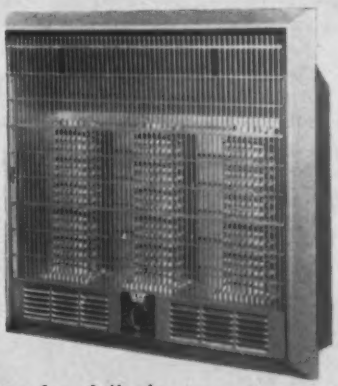
New!

Get your copy of the Radiant Cable Manual from your Ceilheat distributor now.

WRITE FOR FULL DETAILS

CEILHEAT WALL-INSERT HEATERS

FULL 5-YEAR GUARANTEE ON HEATING ELEMENTS



DELTA DESIGN WALL-INSERT HEATERS

Ceilheat Delta-Cone design projects more heat into the room. Eleven models in one, two and three element designs meet wattage requirements from largest living room to smallest bath. Grey hammered finish frame and aluminum grille complement any decor, will not chip, flake or discolor. The design and engineering in these heaters reflect Ceilheat's leadership in electric heating . . . CEILHEAT MEANS DEPENDABLE ELECTRIC HEATING.

Write today for full details on the full line of Ceilheat heating products.

LISTED UNDER REEXAMINATION SERVICE UL UNDERWRITERS' LABORATORIES, INC. OF

CEILHEAT, INC.

5212 Homberg Drive, Knoxville, Tenn.

ample, in a one-floor ranch-type residence of 2480 sq. ft. living space comprising three bedrooms, two bathrooms, living and dining room, the total cost of electricity for a 12-month period came to $270, which included heating from September through April. This family, including three children, added that in the 27-month period of residence with electric heating no one had suffered a respiratory cold although the children had previously suffered from such illnesses.

Cable heat popular

Electric heating took a spurt in this area after the cable type of heating appeared on the market. One of the problems we encountered in our first installation where cable heating was placed in a concrete slab in a residence was making the cables stay in position without floating to the top before the finished cement was poured. After the concrete was poured, we let it set until it was ready to harden. With a stapling machine we stapled the cables to the almost hardened cement. Then a top coat of ½- to ¾-inch finished cement was poured, and the problem was satisfactorily met.

We learned, too, from experience that cables in a ceiling can be repaired behind the plaster. In one residence after we had got our cables in the ceiling, a workman going through the house carrying lumber had broken through the ceiling and cables in 10 spots. One opening was as large as 8 x 8-inches. To our heartbreaking dismay we set about repairing the damage. Using a break-detector on a ceiling already completed in acoustical tile, we repaired all breaks with compression sleeves. The experience taught us that cables were repairable behind plaster. We had to replace the tile, of course.

Promotion program

Selling electric heating is an all-year-round job. While our outside salesman made his daily calls, we promoted electric heating by newspaper and radio the year round. Our local newspaper carried advertisements twice monthly through the four seasons, and radio announced twice weekly for the three spring months the benefits of electric heating.

While this type of promotion served to identify our name with electric heating, the real clincher ultimately was the completed job a prospect visited and discussed with a satisfied owner. Even a job in progress is a good salesman for electric heating, especially after a customer has been educated to the differences of electric heating as against conducted and convected heat. We stress that radiant heat warms the object and not the air around it.

New installations have suffered a setback in this area with the recent rise in electric rates. It is difficult doing an effective selling job in residences when electricity is about 20 per cent too high. We need a return to a 1½¢ rate to have electric heating compete successfully with 14¢ oil. When that happens, we shall again be putting

(Continued on page 98)

Maintenance points for electric space heaters

By R. E. Ward, Chief Deputy Wiring Inspector, Division of Fire Prevention, Department of Insurance and Banking, State of Tennessee

◆ IN MANY LOCALITIES professional services are available for the repair and maintenance of electric heating equipment, either from the electrical contractor, appliance dealers or other repair shops. Too often, these services are not used as they should be, therefore, heating equipment is neglected, and the result is costly to the owners or user of such equipment.

In this article, I will attempt to cover the main points of care and maintenance for space heating equipment, especially the unit type, generally used in heating individual rooms and the like in residential occupancies.

First, before attempting to do any work or cleaning on the heater, or heaters, be sure that all current is disconnected from the heater by pulling the main switch in order to eliminate the shock hazard involved to the one doing the work.

Thorough cleaning

After the current is disconnected from the heater, clean thoroughly by removing all dust, dirt, lint and foreign matter from the entire heater assembly. Should the heater reflector still show discoloration this would indicate, in some cases, it is actually a burned out reflector and cannot be cleaned and should by all means be replaced with a new one. In some cases of this kind when reflectors have lost their ability to reflect heat away from the heater, a serious fire hazard has been found to exist; in that the heat from the unit was being transmitted to the can or container of the heater and from the can or container of the heater to the wall or building structure. Other than a serious fire hazard, one can easily see that efficiency is not being obtained from the heater itself and is a costly method of heating.

Other check points

After cleaning your heater and examining the reflector to determine whether it should be replaced, one should examine all electrical connections. If any are found to be loose they should be tightened and if the element terminals are burned they should be replaced.

Switches and thermostats should be checked and replaced if not in proper working order, and any broken parts replaced or repaired.

On heaters using a fan for circulation, such fans should be completely serviced, including cleaning, oiling and replacements of excessively worn parts.

In closing, I recommend that where professional services are available this service be used in the care and maintenance of your electric space heaters, and again I remind you to be sure that all current is disconnected from the heater, or heaters, before any cleaning or other work is attempted. Replace grill on heater or heaters before restoring service.

By proper care and maintenance you may expect the maximum of service at the minimum price from your heaters for many heating seasons.

Meeting Growing System Needs

Another Allis-Chalmers network transformer goes into service—solving a load concentration problem. Compact design, rugged construction, conveniently located accessories — features that mean maximum dependability and easy maintenance have made this unit the logical choice of utilities everywhere.

If you have a system load problem, skilled, experienced Allis-Chalmers engineers will help you or your consultants in working out a solution. Call your Allis-Chalmers representative, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin, for further information.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5177

TOMIC *Solves* ANOTHER TOUGH PROBLEM
. . . AND SAVES YOU MONEY!

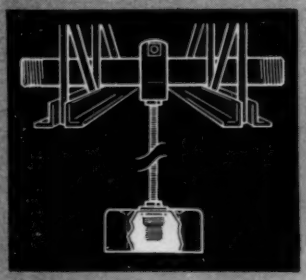
PAT. PENDING

Here's the Answer for Hanging Fixtures from Suspended Ceilings at Lower Cost!

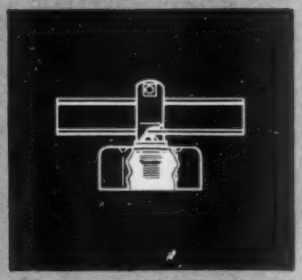
TOMIC ADAPTA-STUDS

NO. 711A-¼" **NO. 711B-⅜"**

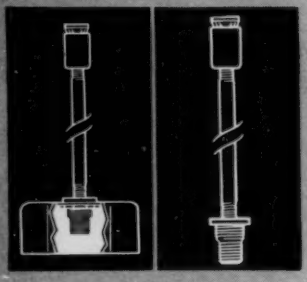
Only one ½" locknut required to secure box. Universal application . . . simplifies transition or conversion from ¼" or ⅜" threaded rod or bolt to fixture stem.



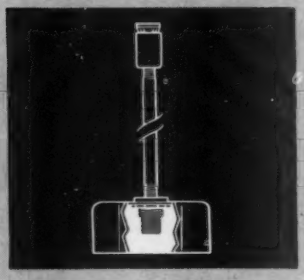
Hanging from bar joists.



Hanging from ceiling channels.



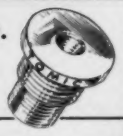
Continuous row stem fixtures. Tremendous advantage for this application.



Hanging from concrete. Removes all stress and weight from box and suspended ceilings.

ONLY WITH ADAPTA-STUDS do you get all these exclusive advantages . . . guaranteeing a quicker, easier, better installation at LOWER COST.

TOMIC SALES and ENGINEERING CO.
20,000 SHERWOOD AVE.
DETROIT 34, MICH.



Please send me a free sample and data on Tomic Adapta-Studs.

NAME_____

ADDRESS_____

CITY_____ STATE_____

Write for Free Sample

TOMIC SALES & ENGINEERING CO.

ORIGINATORS and Manufacturers of Famous TAP-ON Fittings
20,000 Sherwood Ave. • Detroit 34, Michigan

Comment on the Code

Questions and answers on the National Electrical Code constitutes one of the principal features of the annual meeting of the Southern Section, IAEI. Here are verbatim excerpts from the stenographic report* of the meeting held in Dallas recently. Frank Camus, electrical contractor, and B. Z. Segall, consulting engineer, presided over the Code discussion panel sessions.

Insulation on neutral

Frank Camus: Here is the question. "Does the neutral in a 4160 volt underground service entrance have to be insulated for 5 kv?" In other words, would the Code permit this neutral to be insulated for less than 5 kv?

V. C. McFarland: It would have to be 5 kv.

E. B. Paxton: My reasoning would say it would have to be, because it is 4160 volts, and the next standard voltage is 5000.

As to class of insulation, Section 2303-a clearly says: "In the case of service conductors that have a nominal voltage to ground of not more than 300 volts, a grounded service conductor without an insulating covering may be installed."

I think we could almost infer that above that you'd have the same insulating covering on the neutral as on the outside wires.

R. E. Clanton: I think the reason it should be insulated is that if the neutral conductor gets loose from the grounding conductor on the transformer, it becomes a current-carrying conductor the same as your 4160.

Frank Camus: It appears then that the answer to this question would be that the neutral conductor must be insulated.

Insulating bushings

The next question deals with Section 3736-b. It has to do with insulating materials in raceways. "Is it the intent of Section 3736-b to require insulating material when conductors of #4 or larger enter electrical metallic tubing and/or flexible metal conduit?" Does that rule apply to electrical metallic tubing and flexible metal conduit?

Secretary Smith: The answer is "yes."

Frank Camus: Does the panel agree that a bushing should be provided?

M. M. Brandon: What is a raceway?

Frank Camus: Electrical metallic tubing and flexible metal conduit. In other words, is it the intent of the Code to require bushings in that type of raceway?

Secretary Smith: And Mr. Chairman, if the people will go out there in the exhibit room, they will see several different manufacturers out there with these insulated bushings molded right into their fittings, which is the intent to follow this particular section.

Glass store fronts

Frank Camus: Now, here is a problem in regard to a building. This building happens to be used for a grocery store and a great part of this building is window glass. It has a glass front, a glass side of tremendous length, and the inspector asks this: "How does the electrical inspector classify the glass in this building, as a wall or as a show window?"

Now that may not be a Code question, but it is supposed to be clear in the Code.

Secretary Smith: Yes, it is a very important question.

Frank Camus: Mr. Smith, will you answer that question?

Secretary Smith: I'd like to ask Kent Stiner, who was formerly chief inspector of Detroit, to tell the audience what is done in Detroit with regard to that particular rule.

Kent Stiner: I really think the question is trying to find out what the inspectors are presently doing.

What we did there was to try to determine in each building what was the show area. As an example, in these large stores, where we did not know what the occupancy was going to be, we treated it as show windows. In a store where it was known definitely that it would not be used as a show window, it was not treated as such.

Later on, we used the same idea of classifying one of these in which it was definitely not a show window — it was not enclosed, it was strictly an area where people would walk through — yet about two years later, lo and be hold, they had put in show cases all the way around.

So the rule we applied was a common sense one. I think the one that asked the question is trying to find out what the inspectors are doing, and I think some of the discussion should tell us how they are classifying such buildings.

Secretary Smith: But Kent, didn't we in Detroit require that the capacity at the service end or at the service disconnect be of sufficient capacity to take care of any need for load, where a window might be changed from just a glass front to a show window.

Kent Stiner: That was in the service only.

Secretary Smith: That is correct.

Frank Camus: Any active inspector who would like to help this inspector out and give him your experience, tell us what you do in your town.

L. W. S. Cosens: We have never required 200 watts per linear foot as per National Code. Out city ordinance supersedes that by reducing it 50 per cent, 100 watts per linear foot, and any time there is a glass window in the front, the necessary circuit or circuits are carried to that area from the distribution point, and likewise figured against the service, and are provided.

*** Attention is directed to the fact that the individuals contributing answers have not had an opportunity to review or edit their comment. While the stenographic report was made by an experienced court reporter, there is always the possibility that a comment might be recorded incorrectly. Any use made of the information contained here should be made with this fact in mind. In presenting excerpts from the complete report, the editors have been careful not to quote comment out of its context.**

Secretary Miller: Mr. Chairman, if an inspector is enforcing the Code, the definition in your new Code here on page 70 clearly defines what a show window is. Of course, if you don't want to enforce it that way, that is up to you, but nevertheless, it is defined very clearly.

Frank Camus: I think most cities use that same idea, Gus. I know we do in our area. In our Chapter there, we have discussed this several times.

N. E. Cannady: Mr. Chairman, it appears to me that you have a definition in the Code to say what a show window is. It is up to the inspector and contractor, if you have any arguments, to get straightened out on this basis.

Frank Camus: In the question asked, this grocery store is one of these super market deals, and the whole side of it is glass. I am not going to tell you what he decided, but that is his problem. Would you classify that as a show window? The intent of the Code requires 200 watts per linear foot.

N. E. Cannady: Unless they had a platform or something built up there that eventually they could use for displays and things of that kind, I would not call it a show window. If it was just open, right along with the level of the floor, I'd consider it just the same as any other part of the building.

Frank Camus: That is what this gentleman did.

N. C. Cannady: He had a lot of sense. The definition clears it up.

Dewey Johnson: Mr. Chairman, the intent of the Code is that you provide the necessary service for the purpose it is going to be used for, and this defines it here. If it is going to be used or designed to be used for those sort of things, there isn't any substitute for a little common sense.

If you go out there and know what the practices are and you think you know, I don't worry too much about whether or not the Code would define it as a show window or not, I use my own judgment. I wire for it if I think so. If I don't, there is no use in making people install something they are not going to use.

Emergency lighting

Frank Camus: We now have a question on emergency lighting. I am not going to diagram this on the blackboard. We discussed this in Tampa, and also in New Orleans. He wants another answer. Anyway, he has an installation which consists of six disconnecting means supplied from a trough. Adjacent to the six, he has an emergency switch. Now, what he wants to know, does the emergency switch count as a main switch?

(Cry of "No.")

Dewey Johnson: No, you can tap off ahead of your circuit.

Frank Camus: Mr. Watson, would you help us on that?

H. H. Watson: The switch for the emergency system is not counted as one of the six.

Frank Camus: We have another question in regard to the same category. This gentleman asks, "Is it a violation of Article 700 (Emergency systems), Section 7024 (Independent wiring), to install fire alarm systems in the same raceway with emergency systems?" In other words, apparently, he wants to know whether you are allowed to put the conductors for the fire alarm system and the conductors for the emergency lighting system in the same raceway. May you or may you not?

H. H. Watson: You may not.

Frank Camus: You may not. Who disagrees with Mr. Watson? Everybody agrees with Mr. Watson, you may not do it.

Main disconnects

E. L. Brindel: I'd like to ask this question, relative to main disconnect for a residence. I received this letter from a city manager of another town close to my home, and this is the question: "Does your city accept thermo-magnetic breakers as a means for disconnects of a main line electrical service entrance for residence?" What is the answer to that? Does the Code approve it or not?

Frank Camus: I am sure it does, but we will ask the panel. What is the panel's opinion? Does the Code recognize such a disconnect switch.

Secretary Smith: The answer is "yes."

Frank Camus: Does anyone disagree with Mr. Smith?

E. L. Brindel: Under what table?

Frank Camus: 2351a

E. L. Brindel: Does it have to have a manual trip?

Secretary Smith: Yes.

480 v. lighting circuits

Frank Camus: Then it is permitted. Here is the next question. "Is it a violation to connect 400 watt mercury vapor lighting to 480 volt circuits in an industrial building?" He wants to know whether he can connect 400 watt mercury vapor lighting to circuits of that voltage and in industrial buildings.

Secretary Smith: No.

H. H. Watson: I'd like to point out, you don't connect a mercury vapor lamp to that. You connect the ballasts. The ballasts are approved for that service, and certainly it is all right to apply them. As far as control is concerned, it can be controlled from any switch or circuit breaker that is suitable for that voltage.

Q. W. Hargrove: May I ask you a question? That was my question. The ballast happens to be an autotransformer. All I know, that is on the market. In any interpretation, it violates two or three rules to use it. In the first place, it is over 300 volts to ground. Now, if it doesn't violate the Code, I am glad to go ahead.

H. H. Watson: Is it connected across the phase wires, rather than phase to neutral?

Q. W. Hargrove: This is just a 3-phase, delta system; there is no neutral.

H. H. Watson: Mr. Brandon points out exception one to 2113 permits it.

Frank Camus: 2113, (2) also relates to it: "In industrial establishments, office buildings, schools and stores, the voltage of branch circuits which supply only the ballasts for electric discharge lamps in permanently installed fixtures mounted not less than eight feet . . ." et cetera. Apparently the Code recognizes that type of installation. Anybody disagree? If they don't disagree, we will go ahead.

H. H. Watson: I wonder if we have answered this question?

Frank Camus: Does that answer your question Mr. Hargrove?

Q. W. Hargrove: No, I think it says 300 volts to ground, doesn't it?

Frank Camus: He's brought up a different question. He's brought up the question of auto-transformers being connected to a lighting circuit.

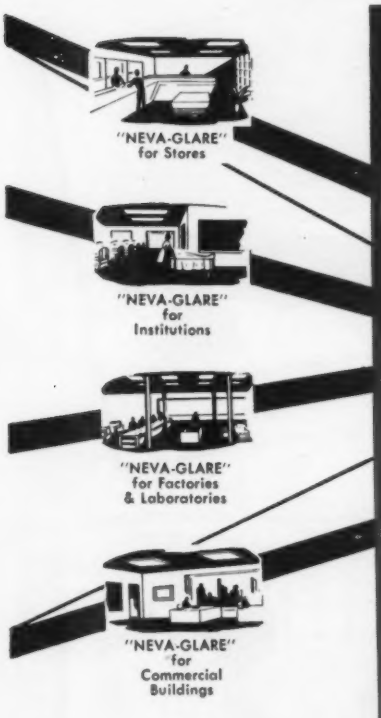
Q. W. Hargrove: That is back at the same thing. If it is all right to go ahead and use it, I am glad to do it. I wonder if anybody else is doing it.

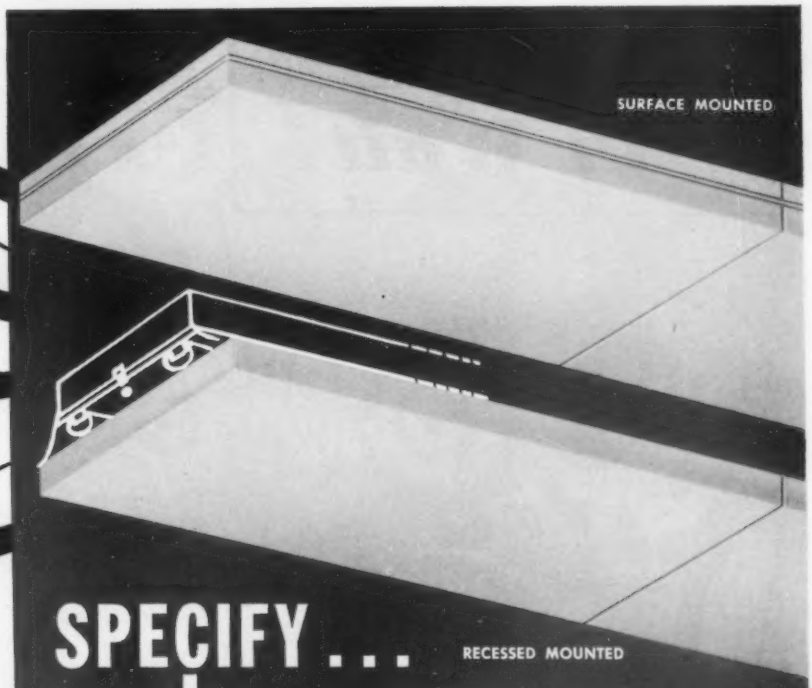
Frank Camus: Mr. Brandon, would you know whether or not that type of fixture is listed?

M. M. Brandon: I think he is right in saying the exception shall not exceed 300 volts to ground. If it exceeds 300 volts to ground,

(Continued on page 97)

BEWARE OF OVERHEAD GLARE!





SPECIFY . . . marlou "NEVA-GLARE" LIGHTING FIXTURES

RECESSED MOUNTED

With Opthalmically Designed Plexiglas or Lucite Diffuser

ABOVE ALL ELSE . . .

EASY-ON-THE-EYES ***diffused light***

EASY TO INSTALL ***in any ceiling***

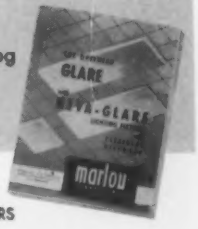
EASY TO CLEAN and MAINTAIN without TOOLS

Profit by the invaluable experience of countless Architects, Builders and Government Engineers who wisely specify MARLOU Lighting Fixtures for stores, offices, factories and institutions.

MARLOU Fixtures greatly reduce overhead glare through scientific light diffusion without loss of brilliance necessary for proper illumination. Of importance, too, is the fact that these modern fixtures are conveniently easy to clean and maintain without tools.

MARLOU "Neva-Glare" Lighting Fixtures are Union made, Underwriters' approved, and recommended by users everywhere. May we at MARLOU have an opportunity to "light the way" for you, too?

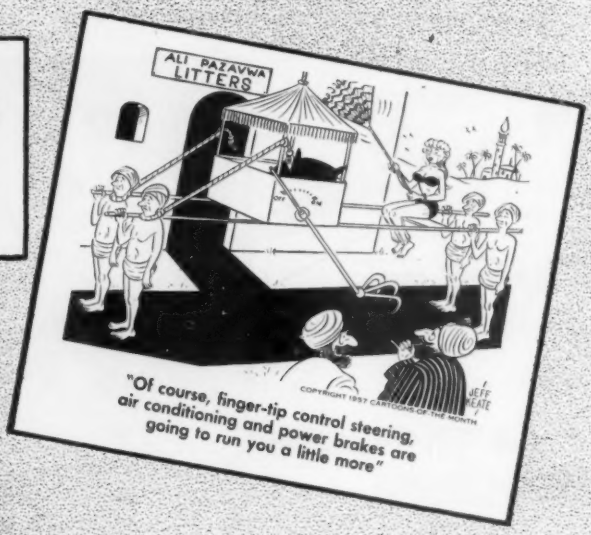
Write for complete MARLOU Catalog



marlou
LIGHTS, INC.
FANWOOD, NEW JERSEY

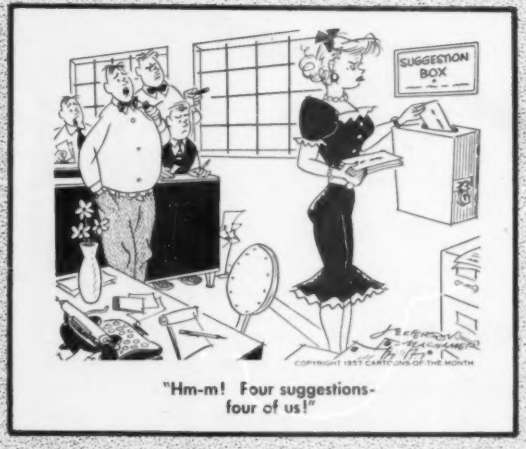
AVAILABLE THROUGH RECOGNIZED ELECTRICAL WHOLESALERS
A few choice territories still open to live Representatives.

Your Work Can Wait!



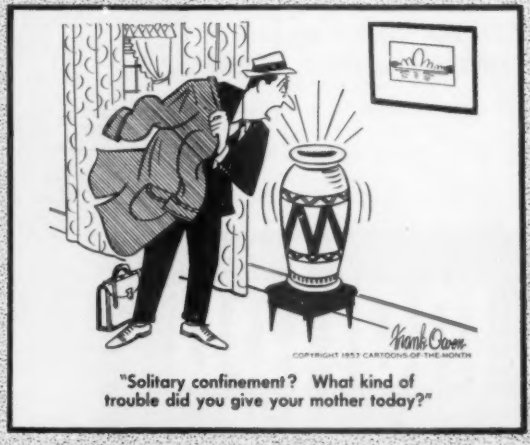
"Of course, finger-tip control steering, air conditioning and power brakes are going to run you a little more"

"Sign here, Frank"



"Hm-m! Four suggestions- four of us!"

"Watch out for the old man- he's on the warpath today!"



"Solitary confinement? What kind of trouble did you give your mother today?"

ROCKBESTOS A.V.C.®

(N.E.C. TYPE AVA)

INTERLOCKED ARMORED CABLE

FOR **New Buildings**
Expanding Existing Circuits
Relocating Old Circuits

Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable . . . is easily installed on racks or hangers beneath the ceiling or next to walls . . . can be installed up, down or around walls, beams or posts. It eliminates costly conduit and ducts . . . saves dollars on these materials . . . easier to install . . . cuts installation time . . . permits quick easy repairs.

Write for the new manual which gives application and design data for Rockbestos A.V.C. Interlocked Armored Cable.

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

New York • Cleveland • Detroit • Chicago
Pittsburgh • St. Louis • Los Angeles • Seattle
New Orleans • Oakland, California

New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

NO. CABLES PULLED - 3

LEAD SHEATHED CABLE (IN CONDUIT)
THREE CONDUCTOR

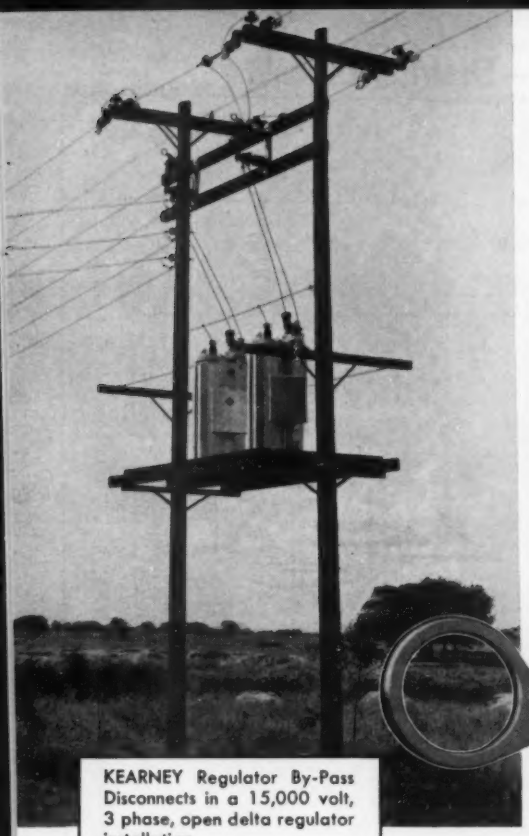
COND. SIZE	HRS. "M" FT.	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
10	12.4	.016	.019	.022	.025	.028	.031	.034	.037	.04	.043	.047
8	14.5	.018	.022	.025	.029	.033	.036	.04	.044	.047	.051	.054
6	20.4	.026	.031	.036	.041	.046	.051	.056	.061	.066	.071	.077
4	26.2	.033	.039	.046	.052	.059	.066	.072	.079	.085	.092	.098
2	37.3	.047	.056	.065	.075	.084	.093	.103	.112	.121	.131	.14
1	41.5	.052	.062	.073	.083	.093	.104	.114	.125	.135	.145	.156
1/0	48.7	.061	.073	.085	.097	.11	.122	.134	.146	.158	.17	.183
2/0	55.7	.07	.084	.097	.111	.125	.139	.153	.167	.181	.195	.209
3/0	62.9	.079	.094	.11	.126	.142	.157	.173	.189	.204	.22	.236
4/0	74.0	.093	.111	.130	.148	.167	.185	.204	.222	.241	.259	.278
250 MCM	82.5	.103	.124	.144	.165	.186	.206	.227	.248	.268	.289	.309
300 "	93.5	.117	.14	.164	.187	.21	.234	.257	.281	.304	.327	.351
350 MCM	102.6	.128	.154	.18	.205	.231	.257	.282	.308	.333	.359	.385
400 "	112.3	.14	.168	.197	.225	.253	.281	.309	.337	.365	.393	.421
NO. CABLES	PULLED- 4											
10	13.3	.017	.02	.023	.027	.03	.033	.037	.04	.043	.047	.05
8	15.4	.019	.023	.027	.031	.035	.039	.042	.046	.05	.054	.058
6	21.8	.027	.033	.038	.044	.049	.055	.06	.065	.071	.076	.082
4	28.0	.035	.042	.049	.056	.063	.07	.077	.084	.091	.098	.105
2	39.9	.050	.06	.07	.08	.09	.10	.11	.12	.13	.14	.15
1	44.3	.055	.066	.078	.089	.10	.111	.122	.133	.144	.155	.166
1/0	52.0	.065	.078	.091	.104	.117	.130	.143	.156	.169	.182	.195
2/0	59.6	.075	.089	.104	.119	.134	.149	.164	.179	.194	.209	.224
3/0	67.2	.084	.101	.118	.134	.151	.168	.185	.202	.218	.235	.252
4/0	79.2	.099	.119	.139	.158	.178	.198	.218	.238	.257	.277	.297

E-101-B

LABOR: INCLUDES PREPARATION TIME, INSTALLING PULL WIRE ON RUNS OF 75 FT. AND UNDER, SETTING UP REELS, PULLING CABLE. (DOES NOT INCLUDE MAKING UP JOINTS, RACKING IN UNDERGROUND VAULTS OR INSTALLING FITTINGS AT ENDS OF CABLES LARGER THAN NO. 2)

2-57

Estimating tabulations published by special permission from "Blue Book of Electrical Estimating," 2nd Edition, Estimating Handbooks Associates, DeKalb, Illinois. Copyright 1956 by Geo. L. Sherlock.



KEARNEY Regulator By-Pass Disconnects in a 15,000 volt, 3 phase, open delta regulator installation.

Safe performance

of 4 operations in proper sequence assured by KEARNEY *REGULATOR BY-PASS* DISCONNECT

- **no danger of accidentally dropping load**
- **no hazard from interrupting exciting current**

With the same motion—in the same time—required to open *one* conventional disconnect, the KEARNEY Regulator By-Pass Disconnect:

shunts the line leads to by-pass the regulator—opens both leads to the series winding—safely interrupts the exciting current.

What's more, you realize substantial savings in cost of switches, installation time, supporting structure and leads, because *only one* KEARNEY By-Pass Disconnect is needed for each phase of a regulator installation, compared to *three* single-throw disconnects. And the operator has *maximum safety*, since all switches can be located on the same side . . . visible from one point!

JAMES R. KEARNEY CORPORATION, *General Offices:* 4224-42 Clayton Avenue, St. Louis 10, Missouri

348

for BETTER CONSTRUCTION
SAFER MAINTENANCE

Specify KEARNEY PRODUCTS

JAMES R. KEARNEY CORPORATION ST. LOUIS MO. GUELPH, ONT.

The Mark of Quality

Plants at: ST. LOUIS • FAYETTEVILLE, ARK. • SHENANDOAH & CLARINDA, IOWA—GUELPH, ONT., CANADA

LEAD SHEATHED CABLE (OPEN UNDERGROUND)
ONE CONDUCTOR

CABLE SIZE	HOURS "M"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
12	2.6	.003	.004	.005	.005	.006	.007	.007	.008	.009	.009	.01
10	4.1	.005	.006	.007	.008	.009	.01	.011	.012	.013	.014	.015
8	4.8	.006	.007	.008	.01	.011	.012	.013	.014	.016	.017	.018
6	6.6	.008	.01	.012	.013	.015	.017	.018	.02	.022	.023	.025
4	8.3	.01	.013	.015	.017	.019	.021	.023	.025	.027	.029	.031
2	11.9	.015	.018	.021	.024	.027	.03	.033	.036	.039	.042	.045
1	13.0	.016	.02	.023	.026	.029	.033	.036	.039	.042	.046	.049
1/0	15.1	.019	.023	.026	.03	.034	.038	.042	.045	.049	.053	.057
2/0	17.2	.022	.026	.03	.034	.039	.043	.047	.052	.056	.06	.065
3/0	19.4	.024	.029	.034	.039	.044	.049	.053	.058	.063	.068	.073
4/0	22.6	.028	.034	.04	.045	.051	.057	.062	.068	.073	.079	.085
250 MCM	24.9	.031	.037	.044	.05	.056	.062	.068	.075	.081	.087	.093
300 "	28.0	.035	.042	.049	.056	.063	.07	.077	.084	.091	.098	.105
350 "	30.5	.038	.046	.053	.061	.069	.076	.084	.092	.099	.107	.114
400 MCM	33.0	.041	.05	.058	.066	.074	.083	.091	.099	.107	.116	.124
500 "	37.1	.046	.056	.065	.074	.083	.093	.102	.111	.121	.13	.139
600 "	40.5	.051	.061	.071	.081	.091	.101	.111	.122	.132	.142	.152
700 MCM	43.8	.055	.066	.077	.088	.099	.110	.120	.131	.142	.153	.164
750 "	45.3	.057	.068	.079	.091	.102	.113	.125	.136	.147	.159	.17
800 "	46.8	.059	.07	.082	.094	.105	.117	.129	.14	.152	.164	.176
900 MCM	49.2	.062	.074	.086	.098	.111	.123	.135	.148	.16	.172	.185
1000 "	51.8	.065	.078	.091	.104	.117	.130	.142	.155	.168	.181	.194

E-101-B

LABOR: INCLUDES PREPARATION, SET UP OF REEL, STRINGING CABLE. (NO EXCAVATION, TAPS OR CONNECTING TO ENCLOSURE)

2-57

LEAD SHEATHED CABLE (OPEN UNDERGROUND)
TWO CONDUCTOR

CABLE SIZE	HRS "M"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
10	4.9	.006	.007	.009	.01	.011	.012	.013	.015	.016	.017	.018
8	5.9	.007	.009	.01	.012	.013	.015	.016	.018	.019	.021	.022
6	8.2	.01	.012	.014	.016	.018	.021	.023	.025	.027	.029	.031
4	10.5	.013	.016	.018	.021	.024	.026	.029	.032	.034	.037	.039
2	14.9	.019	.022	.026	.03	.034	.037	.041	.045	.048	.052	.056
1	16.7	.021	.025	.029	.033	.038	.042	.046	.05	.054	.058	.063
1/0	19.5	.024	.029	.034	.039	.044	.049	.054	.059	.063	.068	.073
2/0	22.4	.028	.034	.039	.045	.05	.056	.062	.067	.073	.078	.084
3/0	25.2	.032	.038	.044	.05	.057	.063	.069	.076	.082	.088	.095
4/0	29.8	.037	.045	.052	.06	.067	.075	.082	.089	.097	.104	.112
250 MCM	33.2	.042	.05	.058	.066	.075	.083	.091	.10	.108	.116	.125
300 MCM	37.6	.047	.056	.066	.075	.085	.094	.103	.113	.122	.132	.141
350 MCM	41.5	.052	.062	.072	.083	.093	.103	.114	.124	.134	.145	.155
400 MCM	44.9	.056	.067	.079	.09	.101	.112	.123	.135	.146	.157	.168
500 MCM	51.	.064	.077	.089	.102	.115	.128	.14	.153	.166	.179	.191
					THREE CONDUCTOR							
10	6.	.008	.009	.011	.012	.014	.015	.017	.018	.02	.021	.023
8	6.9	.009	.01	.012	.014	.016	.017	.019	.021	.022	.024	.026
6	9.9	.012	.015	.017	.02	.022	.025	.027	.03	.032	.035	.037
4	12.6	.016	.019	.022	.025	.028	.032	.035	.038	.041	.044	.047
2	18.	.023	.027	.032	.036	.041	.045	.05	.054	.059	.063	.068
1	20.	.025	.03	.035	.04	.045	.05	.055	.06	.065	.07	.075
1/0	23.4	.029	.035	.041	.047	.053	.059	.064	.07	.076	.082	.088
2/0	26.9	.034	.040	.047	.054	.061	.067	.074	.081	.087	.094	.101
3/0	30.2	.038	.045	.053	.06	.068	.076	.083	.091	.098	.106	.113
4/0	35.6	.045	.053	.062	.071	.08	.089	.098	.107	.116	.125	.134

INCLUDES PREPARATION, SET UP OF REEL, STRINGING cable, (NO EXCAVATION) TAPS or CONNECTING TO ENCLOSURE.

2-57

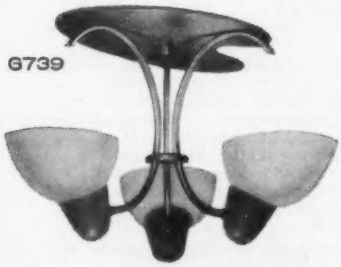
Estimating tabulations published by special permission from "Blue Book of Electrical Estimating," 2nd Edition, Estimating Handbooks Associates, DeKalb, Illinois. Copyright 1956 by Geo. L. Sherlock.

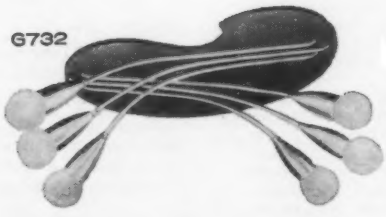
ready for immediate delivery!

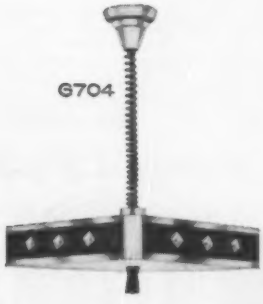
new money makers from GLOBE

You can get excited about these new additions to the Globe lighting line. Designed for dining areas, they feature new approaches in finishes . . . construction . . . illumination.
Specified in new construction, they make homes more salable.
In remodeling, they'll clinch contracts. These outstanding lighting fixtures have "sell" and "satisfaction" built right into them.
And you can have them immediately! Call for your Globe salesman. He will show you the complete new Spring line.

IT'S EASIER TO SELL GLOBE THAN TO SELL AGAINST IT!







Ready Now! New four-color brochure R-156 with Globe's most popular numbers from our recent catalog. *And*—the new Globe Recessed Lighting Catalog showing many patented features. *Write today!*

GLOBE LIGHTING PRODUCTS, INC., 1710 Flushing Ave., Bklyn. 37, N. Y. • Visit our showrooms: 16 E. 40 St., N. Y. 16 • Over 500 fixtures on display.

"FOR OVER A THIRD OF A CENTURY, PLANNED LIGHTING FOR BETTER LIVING"

Look!

No Sealing Ring required!

New, Revolutionary SOCKET METER TROUGH Design by B & C

Completely Eliminates Extra Cost and Installation Bother of the Sealing Ring

Available in steel or aluminum . . . single sockets or gang units for both vertical and horizontal mounting . . . with or without buses and disconnects . . . 5th and 6th terminals available.

Patents Pending

Only 3 Quick Installation Steps

1. Insert meter in jaws!
2. Place cover over meter and under top head!
3. Swing bottom latch over cover tab and seal!

Simplified Construction!

- ★ **Completely Weatherproof!**
- ★ **Easier to Install and Maintain!**
- ★ **Unexcelled Performance!**
- ★ **Ample Knockouts!**

All terminals are 4/0 capacity Hinge-Type, high strength copper. The unique PRESSURE PLATE design is adjustable from #8 wire size to 4/0 cable. The 45° angle of the terminal lugs eliminate sharp bends of the wire. The Hinge feature provides simple, easy conductor entrance and maximum connection security.

Positive corrosion protection... grey hammertone enamel is baked on over special chemical coatings for both steel and aluminum enclosures.

This new B&C design is undoubtedly the finest METER TROUGH ever made . . . it truly deserves your most careful consideration for any type of installation. One of the big features is *plenty of wiring space* . . . the single units are 8" x 8" x 3⅛" . . . the multiple units are on 8" centers both horizontally and vertically. All conduit hubs are interchangeable on standard openings of 1¼", 1½", and 2" and 2½". Interchangeable 1" openings are available if required. Hubs may be ordered separately.

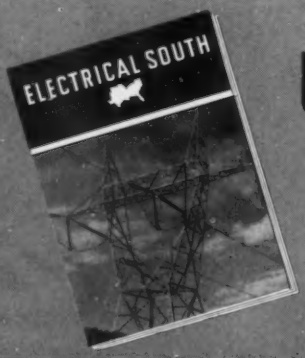
Write for descriptive catalog containing installation data and price list.

B and C

Your Seal of Dependability and Safety

METAL STAMPING COMPANY

590 MEANS ST., N. W. • ATLANTA, GEORGIA



Utility Engineers' Forum

Design
Installation
Testing
Maintenance

AIEE meeting sets session record

◆ THE AIEE Winter General Meeting, held in New York City in January, featured what was probably its largest technical program in Institute history. Varied and interesting inspection trips were also scheduled, all closely allied with the technical sessions.

Highlighting the five-day convention was the joint meeting of AIEE in New York, the Institution of Electrical Engineers in London, and the Engineering Institute of Canada in Montreal, using the new transatlantic submarine telephone cable system to tie the three sessions together. Discussions of the unique features of the new system took place over the cable, while audiences in each of the three cities listened in.

Awarded the Edison Medal during the session was AIEE Past-President C. A. Adams. President M. S. Coover, who officially opened the meeting with his report to Institute members, presented the AIEE Prize Paper Awards.

Following are excerpts from some of the papers having special interest for utility engineers and operators.

Method recommended for insulator wash

Energized insulator washing is a safe, economical method of removing most contaminants from power station insulators and apparatus bushings, thereby eliminating station flashovers, according to a report by J. M. Mabe of the Central Power & Light Co., Corpus Christi, Texas.

Mr. Mabe presented a paper, "Energized Insulator Washing in Substations," at a session on substations.

Energized washing means cleaning of insulators when they are "hot" or without power turn-off. Contaminated insulators can cause flashover with resultant loss or shutdown of power. From 1925 to 1942 cleaning was done by deenergizing the insulator and wiping with a wet rag, Mr. Mabe reported.

"As the use of electricity increased," he said, "it became more difficult to remove equipment from service for the long period required to hand clean insulators."

First attempts at energized cleaning by trying to create artificial rain over the insulator proved unsuccessful because of flashover, said Mr. Mabe. After a 1950 service interruption at the Central Power & Light Co., following deenergized hand-washed cleanings, a test was run to determine leakage currents that could be encountered in washing equipment energized at 40 kv line to ground.

"Using an adjustable Elkhart 1½" mystery nozzle with tap water pressure of 55 psi, and with an initial separation of 20 feet between the nozzle and the insulator energized at 40 kv, leakage current through the water stream was checked by connecting a milliammeter in a lead from the nozzle to ground. The test was discontinued at a distance of four feet between the nozzle and the energized insulator because of excessive water spray. No leakage current was detected. Resistance of tap water used was 650 ohms/cubic inch."

After these initial tests, it was found that, in order to prevent electric shock, the men handling the nozzle had to stand on a metal plate with nozzle tied to plate and the plate tied to the ground.

It also was discovered that use of distilled water for energized washing prevents some of the flashover that occurs during washing. The question of when to wash insulators has no definite answer at the present time, Mr. Mabe concluded.

Engineers recommend insulation reduction

Definite economies in use of transformers with reduced insulation were reported by P. S. Pugh and C. P. Zimmerman, American Gas and Electric Co., New York, at a transformer session.

The authors stated that use of

insulation two steps down on 138 kv power transformers resulted in decrease of approximately 20 per cent in weight; 25 per cent, in first cost; 14 per cent, in kilowatt loss; and 12 per cent decrease in kvar loss. The reduced insulation was from the 138 kv class (650 kv basic insulation level) to the 92 kv class (450 BIL).

They added that their company in the past 22 years has installed more than 7-million kva of transformer capacity on its 132 kv system, utilizing the lower insulations level, and saving $2,500,000 in first cost alone.

Two reasons why lower insulations are possible on transformers, they said, are improvement in lightning arrester design and the practice of impulse testing 138 kv transformers at the factory.

The authors' paper, "Operating Experience on AG & E 132 KV System With Transformer Insulation Reduced Two Classes," discussed the historic background and reasoning behind use of the reduced insulation on the company's system.

Lightning protection concepts improved

Critical reviews of operating experience in transmission systems can lead to adoption of new lightning protection concepts.

That was the opinion expressed by E. H. Gehrig and R. S. Gens, of the U. S. Department of Interior, Bonneville Power Administration, Portland, Ore., in a paper, "Experience Revises Substation Lightning Protection," during a session on protective devices.

The two government engineers reported that, as a result of experience and an extensive study of lightning problems, the Bonneville Power Administration adopted the following innovations which have resulted in adequate performance at reduced cost:

(1) Small 115 kv transformers with reduced insulation levels are protected by rod gaps without overhead groundwires on incoming lines.

(2) Lightning arresters are eliminated in large stations with four or more lines.

(3) Line circuit breakers are protected by rod gaps on the line side.

They said that, subsequent to the war, the system expanded rapidly with 100 circuit-miles of 115 kv feeder lines and 150,000 kva of 115 kv transformer capacity being installed annually. The large percentage expenditure for standard lightning protection on the numerous small substations with 3,000, 6,000 and 12,000 kva transformers did not seem justified. As a first step in reducing costs, equipment insulation levels were reduced first from 1050 BIL to 900 kv and later to 825 kv BIL on the 230 kv and from 550 kv to 450 kv BIL on the 115 kv system. Secondly, station type arresters and groundwires were applied on a more limited basis. This program, which evolved from experience and a number of years of intensive studies, lead to a very satisfactory operating record.

The authors reported that the encouraging lightning experience record since the changes encompass an expansive geographical area with varied lightning conditions and a substantial number of stations in the different voltage and size categories. At present, they said, the system has a total of 9,264,000 kva of transformer capacity installed.

The successful operation of the substantial number of rod gaps in service, they indicated, can provide both economical and adequate substation protection in specific applications. Lightning arresters, however, continue to remain the indispensable safeguard in the majority of installations.

The lightning studies are continuing. Further revision of protection practices, they concluded, will depend on investigation of the following problems:

(1) Maintenance testing of all elements of the lightning arrester.

(2) Application of 70 per cent lightning arresters.

(3) Ability of lightning arresters to discharge switching surges.

Air-blast breakers lessen fire hazard

A new air-blast circuit breaker, recently installed by a large metropolitan utility, was described at a switchgear session by R. B. Shores and J. W. Beatty, of the General Electric Co., Philadelphia.

In a paper entitled "A New 138 KV, 10,000 MVA Air Blast Circuit Breaker," the authors described the breaker as having several advantages over more conventional devices, which include reduction in fire hazard, ease of maintenance and inspection with resultant low maintenance and shorter outage time, compared with an oil breaker.

In 1940 there was considerable interest in air-blast breakers, but this waned in the face of high costs. These, however, have been reduced, but the number in use is now growing, and there are now or shortly will be outdoor air-blast breakers with ratings through 330 kv, they said. A limiting factor in this country is the custom of using current transformers on both sides of breakers. Perhaps, they said, a re-survey of American practice will lead to adoption of a transformer on one side of the breaker only.

"This new 138-kv outdoor air-blast circuit breaker incorporates many features which experience has indicated to be desirable in air-blast breakers for the American market."

Switching surge factor in transformer design

A FIVE-YEAR study on dropping power transformer basic insulation level (BIL) two steps, revealed that switching surge voltage, rather than lightning surge protection, is the "predominating factor in the design and application" of such transformers.

This was the report by E. M. Hunter, J. R. Meador and W. J. Rudge, all of General Electric Co., in a paper, "Reduced Transformer Insulation," presented during a session on transformers.

The authors pointed out that the study also led to the conclusion that transformers insulated two steps down would be applicable to many high voltage systems and could be made available to users at a substantially lower price. The application of reduced insulation transformers is based on the generally accepted principle of power system design that it is more economical to limit overvoltages and reduce insulations, than to accept the overvoltages and increase the insulation accordingly.

For the first time, they said,

The answer to industry's need for a QUALITY safety switch

type SCSD and SAHD SHUTLBRAK SWITCHES *for heavy or standard duty*

Ⓕⓐ type SCSD, standard duty, or SAHD heavy duty switches are the finest in safety, dependability, long-lasting and trouble-free operating switches.

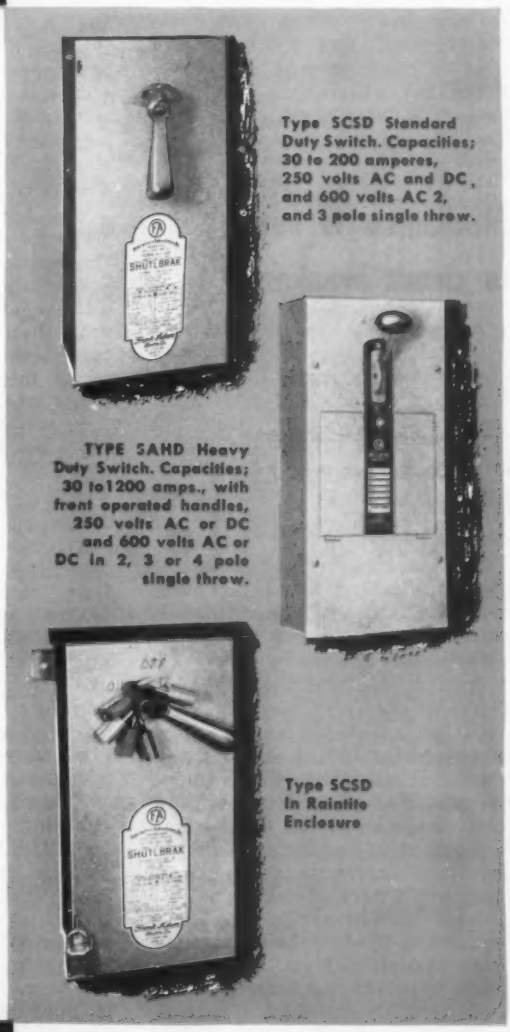
Approved by the Underwriters' Laboratories' Inc., these switches embody all the latest features in design and construction which makes them outstanding for all switching purposes.

Both types of switches are horsepower-rated. Both feature quick-make and quick-break, made possible by a shuttle mechanism with heavily silvered contacts which roll under pressure and improve with use.

The Ⓕⓐ type SCSD switch combines both interlocking and non-interlocking switch features in one unit. Kamklamp pressure type fuseholders, rotary operating handles with padlocks to indicate "off" and "on" positions are other features.

The Ⓕⓐ SAHD has interlocking fuse door which automatically locks when the current is "on" and permits access when the switch is "off". (An intermediate position of operating handle permits access to authorized persons.) Handles are arranged with padlocks in "off" and "on" positions.

So give your customers the finest in switching. Install Ⓕⓐ type SCSD and SAHD Shutlbrak Switches wherever a heavy or standard duty switch is needed. See your nearest Ⓕⓐ representative listed in Sweet's for further information.



Type SCSD Standard Duty Switch. Capacities; 30 to 200 amperes, 250 volts AC and DC, and 600 volts AC 2, and 3 pole single throw.

TYPE SAHD Heavy Duty Switch. Capacities; 30 to 1200 amps., with front operated handles, 250 volts AC or DC and 600 volts AC or DC in 2, 3 or 4 pole single throw.

Type SCSD In Raintite Enclosure

Frank Adam Electric Co.

BOX 357, MAIN P. O. • ST. LOUIS 3, MO.

Phone JEfferson 3-6550

Makers of:
busduct • panelboards • switchboards
service equipment • safety switches
load center • Quikheter

switching surges appear to be the limiting factor in insulation coordination because the improvements in the lightning protective characteristics of arresters have been greater than the improvements in the switching surge protective characteristics.

The paper concluded that since the switching surge voltage is the main consideration in coordinating two-step down BIL transformers, further work is necessary to establish industry standard for evaluating protection under these conditions. To that end, Messrs. Hunter, Meador and Rudge said, the GE study is continuing. In the meantime, they added, additional service experience with two-step down transformers and arresters will lead to more general use of reduced insulation with associated savings to industry.

Mechanism is boon to circuit breakers

ABILITY to operate directly from a low power ac source without need of rectifiers, and manually, or from a lamp circuit or potential transformer in an emergency, heads the list of advantages of a new motor-powered stored-energy operating mechanism for closing magnetic-type power circuit breakers in metal-clad switchgear.

The mechanism was described by E. T. McCurry and J. A. Favre, of General Electric Co., Philadelphia, Pa., in a paper presented at a switchgear session.

The authors said that, because the new operating mechanism is based on a reliable and well-accepted design "5" of which many thousands have been furnished in the past five years for operating low voltage air circuit breakers, it is expected to supplement existing operating mechanisms and find ready acceptance among users.

Other advantages of the new mechanism cited by the authors include operation from a low capacity 48 or 125 volt battery of the size normally used for circuit breaker tripping, because of low power requirements; safe, sure closing against full momentary current on manual operation when no closing power is available; and characteristics not affected by temperature variations, aging or atmospheric conditions.

It is especially suitable for applications requiring high speed closing and reclosing.

Lightning protection is greatly increased

Two of the nation's foremost researchers on lightning protection stated that the last 25 years has witnessed unprecedented improvement in that field.

They were Philip Sporn and I. W. Gross, president and electrical research engineer, respectively, of the American Gas and Electric Service Corp., who presented a joint paper, "A Quarter Century of Experience in Insulation Coordination: Basic Philosophy, Application, and Operating Experience on the American Gas and Electric Company System."

The American Gas and Electric System, they said, includes all transmission voltages and associated equipment from 2.3 kv to 345 kv, excluding 230 and 287 kv, on more than 72,000 pole-miles of line and more than 1,200 substations; hence, their experience with lightning protection has been vast.

They reported that: "The BILS (basic insulation levels) set initially in the 1941 report of the AIEE, EEI, NEMA Committee on Insulation Coordination have proved to be sound, with adequate flexibility for economic application. The authors have worked effectively with this framework.

"The 60 cycle rating of the lightning arrester is the base point for determining a suitable BIL, and therefore must be selected only after full and careful consideration of all factors affecting the arrester operation in service.

"Aimed for margins between lightning arrester protective levels and BILS have generally been 30 per cent, but 20 per cent has been used. With the newer (1955) arresters much larger margins have become available.

"Systems with grounded neutrals can in general be protected by lightning arresters rated 80 per cent or less than those used on isolated neutral systems.

"Since system rated voltages follow a pattern in which any system voltage is roughly 80 per cent of the next higher one, the required BILS follow approximately the same pattern, assuming similar margins of protection between BILS and LA protective levels. Because of this, one level down in BIL has been a logical and safe step where station type arresters are used, so far as safe lightning protection is concerned.

"With the newer arresters (1955) having some 20 per cent lower impulse level, two steps down in insulation is in some cases possible.

"Substantial economies in transformer first cost are possible in applying reduced insulation on transformers in insulation classes 92 kv and above; below the 92 kv class the saving is very small or non-existent. Added savings result in transportation, handling, and construction.

"In applying arresters to protect very old equipment, a compromise frequently has to be made in the desired margin between the lightning arrester protective level and equipment strength, and a calculated risk taken between the failure in service of the LA or the transformer. The improved characteristics of the newer arresters may alleviate this condition, where replacement of arrester is economically justified.

"Commercial impulse testing of transformers has been an important aid in the development of insulation coordination, and a bulwark in effecting major economies flowing from application of coordination principles. Fast front test waves chopped on the front, and the full wave check two points on the transformer volt time insulation curve. Experience clearly shows that they should be continued.

"There is need for an investigation of switching surges, and need for determining the strength of equipment under surge stress.

"Identifying the recommended BIL values by 'Insulation Class' or 'Reference Class' approximately the system line-to-line voltage for an isolated neutral system, has in the authors' experience, greatly simplified the understanding of BILs and their application.

"While a great deal of work has been done on the authors' system in bringing about insulation coordination, and substantial economies as well as improved service effected thereby, studies are still being carried out to further increase the economies brought about by insulation coordination, particularly in the light of the opportunities that the 1955 arresters have opened up."

THE BEST COSTS LESS INSTALLED

EXCLUSIVE "INCH-MARK"® makes quick measurement a cinch. Every length of Republic ELECTRUNITE® E.M.T. is like a 10-foot rule—marked off from end to end in *feet* and *inches*. You avoid the clumsy problem of a flat rule on a round tube . . . eliminate guesswork. To cut tubing, a 32-tooth hacksaw blade is recommended.

EXCLUSIVE "GUIDE-LINE" extends full length of tubing. By properly aligning with calibrations on Republic Bender, bends are kept in the correct plane, thus avoiding costly "wows". Get perfect saddles, offsets and back-to-back bends. Both "Inch-Marked" and "Guide-Lined" features come in ½", ¾", 1" and 1¼" sizes.

EXCLUSIVE "INSIDE-KNURLING" reduces friction, thanks to inside ball-bearing surface — makes wire pulling as much as 30% easier. ELECTRUNITE E.M.T. is made to Underwriters' Laboratories Standards—is approved by the National Electrical Code for concealed, open and concrete construction.

UNIFORM DUCTILITY in every foot of Republic ELECTRUNITE E.M.T. assures smooth, accurate bends *every time*—with no costly kinks. Welded by the famous Electrunite Process, this quality conduit is 100% Republic — from ore to finished product. And rigid manufacturing-controls assure *complete* uniformity.

GALVANIZING protects every inch of Republic ELECTRUNITE E.M.T. The special galvanized finish will not chip or flake when tube is bent. And because ELECTRUNITE E.M.T. is threadless, there's no unprotected steel exposed at the joint, no wrench marks to damage the smooth finish.

UNIFORM CONCENTRICITY provides a truly round tube for snug-fitting connections that completely shut out moisture and concrete—protect against fire. Easy-to-use fittings that make sturdy, rain- and concrete-tight joints are available in a complete range of types and sizes.

INSTALLATION ADVANTAGES OF E.M.T. make it your most practical raceway. To make tight joints, you simply tighten the fitting, not the entire run—a real aid where space is limited. Furthermore, it's lightweight—easy to handle. A bundle of ½" size—100 feet—weighs only 32 pounds.

COMPLETE INFORMATION on Republic ELECTRUNITE E.M.T., Rigid Steel Conduit and Dekoron®-Coated E.M.T. and Conduit for severe corrosive atmospheres is available upon request. Simply check desired material in coupon. And on your next job . . . specify Republic ELECTRUNITE E.M.T.

NATIONAL ELECTRICAL Week

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
227 East 131st Street
Cleveland 8, Ohio

Gentlemen:
Please send me additional information on:

☐ ELECTRUNITE E.M.T. ☐ Rigid Steel Conduit
☐ Dekoron-Coated E.M.T. ☐ Dekoron-Coated Rigid Steel Conduit

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

C-3011A

Relay systems need up-to-date approach

A modern scientific approach to proper communications systems planning and engineering, necessary because of the variation and complexity of new techniques of equipment, was outlined by Victor J. Nexon, of the MSI Communications Consulting Engineers, New York, N. Y.

Mr. Nexon, in a report, "The Modern Approaeh to Communication Transmission Systems Planning and Engineering," before a session on radio communications systems said that the new members of the communications transmission family such as VHF ionospheric and UHF tropospheric transhorizon systems, together with the line of sights microwave systems, "provide the prospective user with interesting alternatives" and require an extensive and detailed study before installation.

The "modern approach" as described by Mr. Nexon includes the determination of communications objectives, a feasibility study, ascertaining final system design and construction specification, and an evaluation of contractors' bids.

Microwave new tool for reliable relaying

Microwave was described as a new tool for protective relaying on power lines by J. R. Linders and V. A. Nosko, of the Cleveland Electric Illuminating Co., Cleveland, Ohio.

"This new tool is reliable, secure, and continuously monitored point - to - point communication," they maintained.

"Microwave for relaying and operating purposes" will ultimately allow new concepts of system-design because of the firm solution it offers to many present day problems. For example, the super position of the distributing function on transmission systems can be further developed. It will also make it possible to minimize system components, such as circuit breakers, which are not directly necessary for the transmission and distribution of power. Not only will this result in direct savings, but operating and maintenance savings will be realized from such a system. The full implementation of these concepts will also lead to an improvement in system capability as well as the reduction of system costs," they stated.

Protective relaying by use of microwave has the following advantages:

(1) No power system components or connections are used.

(2) The number of high voltage components are reduced, thus minimizing equipment failures which might cause customer outages.

(3) Component failures need not cause circuit outages—standby equipment is practical and economical.

(4) Maintenance of the equipment can be done with circuit outages.

(5) Personnel and system hazards are minimized because of the reduced high voltage switching for construction and maintenance needs.

(6) The problem of additional space required for 1200-ampere traps and for coupling devices as in carrier relaying installations is avoided.

(7) A new degree of freedom is available for integrating older parts of the system into new system requirements.

(8) Multi-terminal line relaying problems are minimized and satisfactory system performance can be realized with microwave relaying from many system configurations formerly considered unsatisfactory because of relaying limitations.

Future engineers seek jobs which stimulate

Continuous opportunity to work on worthwhile and stimulating problems within their potential abilities, and possibility of taking on increased responsibility are primary considerations of today's graduating electrical engineering students seeking employment.

This was the report of D. S. Babb and M. S. Helm of the University of Illinois, Urbana, Ill., in a paper, "Attitudes and Ethical Values of Present-Day Electrical Engineering Students," which was an evaluation of a student panel discussion.

The majority of students is not unduly influenced by glittering promises of bonuses, fringe benefits or employee conveniences. "Offers of a bonus for accepting employment," the paper said, "are likely to be rejected. Students are skeptical of such companies and are becoming increasingly wary of those industries that offer traditionally high starting salaries without job security."

Security, it continued, is not considered by the student as merely retention on a company payroll but is regarded in terms of chances to advance according to ability and to develop professionally and creatively.

Remarks and attitudes of the students, said the authors, also suggest publicity needs about engineering. There are two times in the life of a student when publicity about engineering is needed. The first is while the student is in elementary and secondary schools, and the second, while he is in engineering college.

For pre-college students, the authors suggested, publicity should be quite general and somewhat glamorous to stimulate a positive interest in engineering, while the college student should be offered information on engineering problems in companies that employ engineers. Although considerable material of good quality has been prepared by several organizations for use in elementary and secondary schools, publicity about engineering opportunities for females is lacking, and many women do not pursue a natural interest in engineering because of a feeling that it is strictly a man's field.

Less has been done, said the authors, to provide the type of publicity needed by engineering students to help bridge the gap between academic studies and work in industry. As we see this publicity problem, they continued, answers are required to the following questions:

(1) What can be done to best acquaint the student with present-day engineering problems and the part he will play in solving these problems?

(2) What can be done to acquaint the student with the needs and work of engineers in companies where the name of the company does not suggest the need?

(3) What should company brochures contain to be of most use to the student?

(4) What changes should be made in interviewing procedures?

(5) What should be the nature of summer employment offered to

New Hubbard Film Demonstrates Lightning Arrester Operation

The subject of power system lightning protection is complex and difficult to explain by conventional methods. This film, using new techniques of animation and ultra-high speed photography, facilitates the understanding of the many variables entering into the problem of lightning protection.

Produced in the Hubbard Research Laboratories especially for utility personnel, this film entitled "The Magic Cylinder" details formation of natural lightning, the effects of lightning on a power system, the duty on arresters, and the operational characteristics of the types in current use.

In full color and sound, with running time of 28 minutes, the picture is without counterpart in its educational coverage of this complex subject.

You can arrange for a showing of this brand new color film by contacting the Advertising Department of Hubbard and Company, 6301 Butler Street, Pittsburgh 1, Pennsylvania.

HUBBARD AND COMPANY

Pittsburgh 1, Pa. • Chicago, Ill. • Oakland, Calif. • Plano (Dallas), Texas

undergraduate students?

(6) What help do the colleges need from industry in order to keep up with rapidly changing developments and their effect on the requirements for new engineering personnel?

Extending useful life of transmission poles

AN EXTENSIVE study by a power company showed that pine poles and timbers used in transmission lines can be "economically preserved for a long, useful life."

This was the report of F. W. Smith, Virginia Electric & Power Co., Richmond, Va., in a paper, "Appraisal — 30-Year-Old Wood Transmission Structures," before a session on transmission and distribution.

The study covered over 1,000 poles, most of which were approximately 30 years old, Mr. Smith said. The opportunity for this unusual, widespread inspection came about when all wood structures were removed to make way for a new line of much greater capacity.

Mr. Smith's figures on the inspection of the poles showed that approximately 80 per cent were salvaged for further use. About 50 per cent of the damage which made the discarding or cutting of a pole necessary occurred at the groundline or along the buried portion of the pole. The instances of internal decay exceeded those of external or surface decay.

He offered the following recommendations from his company's study:

(1) The useful life of a pole or timber can be extended by retreatment before serious deterioration takes place. This may be accomplished by a length pressure treatment or by a groundline treatment of standing poles.

(2) More information is needed about the incidence and progress of decay and deterioration of wood structures.

(3) Planned inspections and maintenance measures must be employed to secure optimum useful life. Continuing records will be a part of this work.

(4) Design and construction of structures should be carried on with wood preservation an important factor. Eliminate cutting and boring whenever possible.

AIEE head decries acute training gap

The gap between high school training and college entrance requirements in this country is acute and tragic, according to M. S. Coover, president of the American Institute of Electrical Engineers.

"It seems incredible that we can think of continuing our well-integrated educational system in America without taking immediate steps to reduce this gap," Mr. Coover said. He is administrative assistant, Division of Engineering, at Iowa State College, formerly, assistant dean.

Fundamental revision must take place in all science and engineering curriculums, particularly at the college undergraduate level, and it is time to break with tradition and eliminate types of vocational courses which belong to technician training programs, he said.

Citing immense progress made in engineering and science, and increased need for graduates of higher competence in these fields, Mr. Coover said: "It becomes imperative that methods be developed whereby these high levels of competence can be reached successfully. I believe that our colleges and universities realize their responsibility in this regard. One of the major obstacles is that the lure of industrial salaries with their accompanying benefits is rapidly depleting our colleges and universities of quality teachers. Replacement is becoming more difficult and at the same time more potential students seek admission.

"Also, of equal concern is whether adequate preparation is being made for admission into our colleges and universities. Here, too, it is possible to locate reasons for conditions that exist . . . economic circumstances have lured too many good high school teachers to other employment. Without proper guidance, particularly at home, potentially capable high school students can drift into the more glamorous courses that are now being offered. All too often parents leave guidance to teachers, and serious-minded, capable counselors seem to be rare. A lengthening dimension, thus, is being created between high school terminus and college entrance requirements.

"We in America believe in local control in education. It can be made to work properly. Unfortunately, school administrators in some communities, acting with good intentions based on inadequate information or yielding to pressure from those who would spare their children from the more rigorous science courses, have permitted the quality of those courses to decline or, except for mathematics, to disappear. To reverse this trend is neither easy nor inexpensive.

"As engineers, as parents, and as citizens who are deeply concerned about the future of our nation, we need carefully to evaluate trends in educational standards in our own communities. This is an individual problem for each of us. We need to realize that the time is upon us to develop a corrective program wherever needed and to take action before the burden becomes too great. No burden is too great to bear if it means national preservation. The gift of educational opportunities for our youth is ours. It is our responsibility both individually and collectively to make the best use of this heritage."

Binary code called exciting development

THE BINARY code, a communications system by which a signal can pass through any number of repeaters without variation, was called "an exciting development" for transmission engineers by F. K. Bowers, of the Bell Telephone Laboratories, Inc., Murray Hill, N. J., in a paper, "What Use is Delta Modulation to the Transmission Engineer?", before a session on communication theory.

Mr. Bowers said that this exciting development would become even more important as communications systems get more complicated and repeaters get smaller and cheaper.

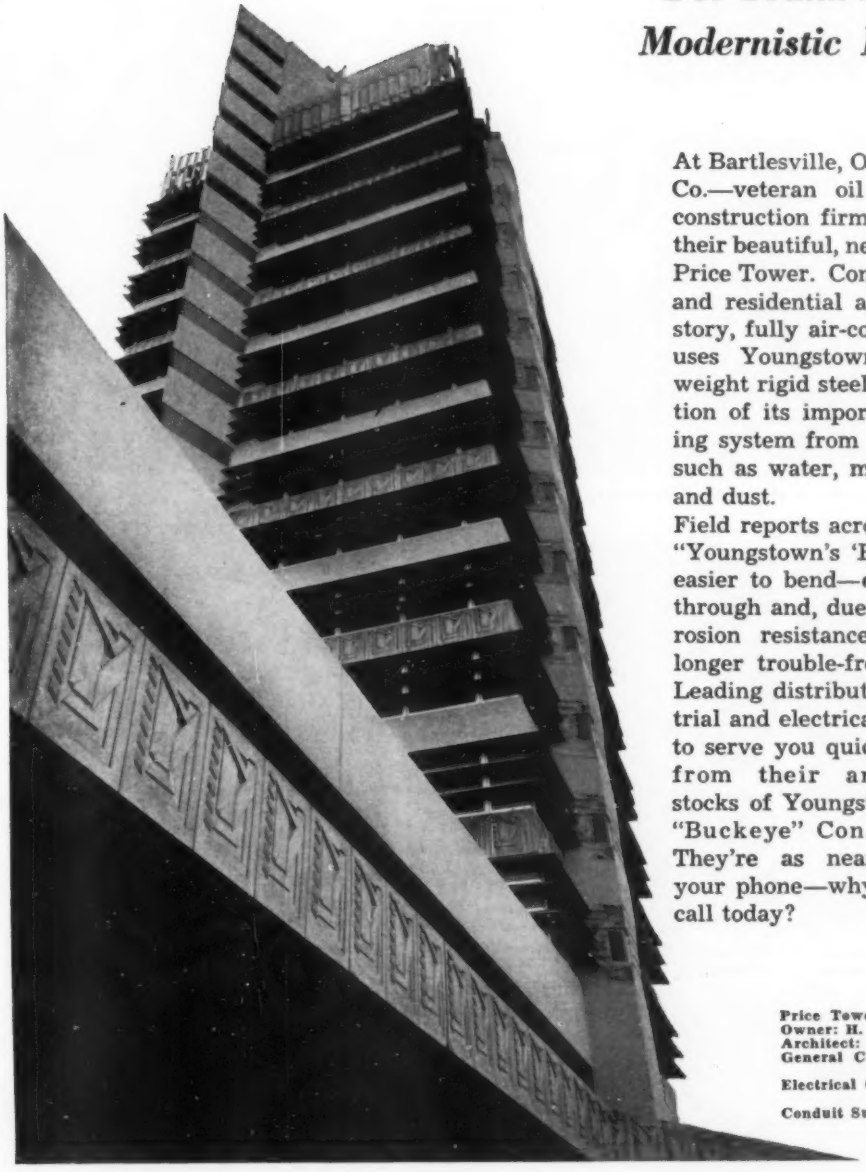
In a comparison of Delta Modulation and pulse code modulation (PCM), rival communications systems of coding a continuously variable signal into binary form, Mr. Bowers reached the following conclusions:

"Delta Modulation is the simplest and cheapest way we know of converting a continuous signal into code-form, and is to be preferred whenever we want to code one channel at a time. It is not

(Continued on page 98)

YOUNGSTOWN "BUCKEYE" CONDUIT

. . . *Provides Lifetime Wiring Protection For Frank Lloyd Wright's Modernistic Price Tower*



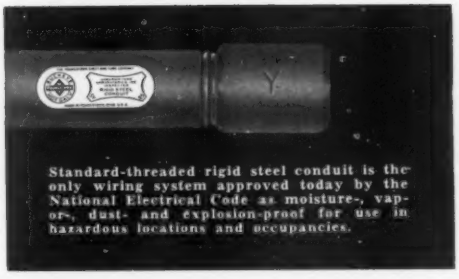
At Bartlesville, Okla., the H. C. Price Co.—veteran oil and gas pipeline construction firm — recently opened their beautiful, new cantilever-design Price Tower. Containing both offices and residential apartments, this 19-story, fully air-conditioned structure uses Youngstown "Buckeye" full-weight rigid steel conduit for protection of its important electrical wiring system from damaging elements such as water, moisture, vapor, dirt and dust.

Field reports across-the-nation state: "Youngstown's 'Buckeye' Conduit is easier to bend—easier to fish wires through and, due to its superior corrosion resistance, affords a much longer trouble-free service life."

Leading distributors in every industrial and electrical market are ready to serve you quickly and efficiently from their ample stocks of Youngstown "Buckeye" Conduit. They're as near as your phone—why not call today?

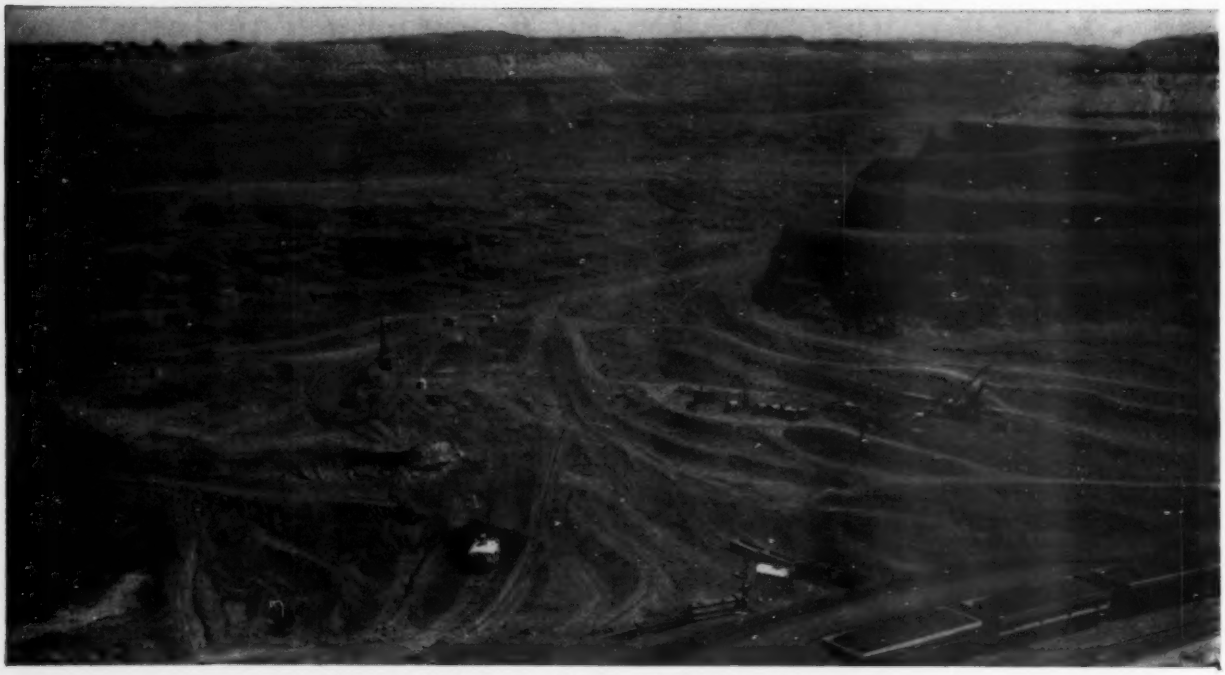
QUALITY YOUNGSTOWN SERVICE

Price Tower, Bartlesville, Okla.
Owner: H. C. Price Co.
Architect: Frank Lloyd Wright
General Contractor: Culwell Construction Co., Oklahoma City, Okla.
Electrical Contractor: Industrial Electric Co., Oklahoma City, Okla.
Conduit Supplier: Westinghouse Electric Supply Co., Oklahoma City, Okla.

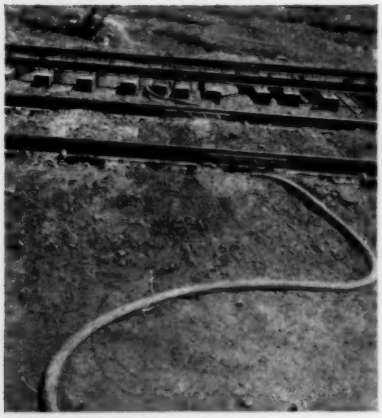


Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

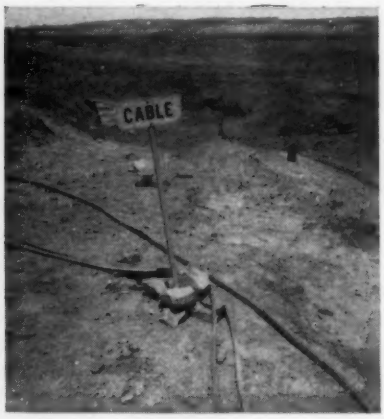
THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities



Over-all view of mine. Each ore car in foreground contains about 60 tons of ore.



Tracks are constantly being moved as pit enlarges. Cables are moved with the tracks.



Cables lie in the sun or rain without any protection. They don't need any.

Shovel, being moved, carries 5000 feet of cable with it in the steel box.

Workman manhandles the cable trailing a churn drill as it heads for new location.

Notice long span of this cable bridge and extreme flexibility of cable in foreground.

Shovels lift up to 18 tons in one bite; they operate 24 hours a day.

Entrance poles and meter houses. Cables start from here, work at 440 or 4000 volts.

Iron ore mine finds Tiger Brand Amerclad *in use since 1928*

THE PICTURES show one of the greatest open pit iron ore mines in the world. From pole-head to meter house to shovels and drills, Tiger Brand Amerclad electrical cable serves as a flexible nerve system to supply the huge electrical requirements of machines that operate 24 hours a day in temperatures that range from 100° in the shade to minus 40° in the shoulder-deep snow.

Some of this cable has been in use since 1928, and it's still good.

Other cable is right in the blast area, where it is dragged over sharp rocks and pounded by dynamite-propelled boulders. Even this cable averages six to eight years of useful life.

Look at the pictures and read the captions that tell about operating conditions. You'll see why *no* heavy-duty electrical cable has a greater reputation than Tiger Brand Amerclad. Call your American Steel & Wire representative for the whole story.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS TIGER BRAND ELECTRICAL WIRE & CABLE

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB

- asbestos wire and cable
- mold cured portable cord
- shovel & dredge cable
- paper & lead cable
- varnished cambric cable
- interlocked armor cable
- special purpose wire & cable
- aerial, underground and submarine cable

UNITED STATES STEEL

Microwave system mushrooms with

On Arizona mountains, microwave equipment is housed in sheet metal fabricated buildings which are constructed in Company machine shops.

Occupying entire wall of load dispatching room is a system one-line diagram showing circuit breaker indications in red and green lights.

Southwest population boom has Arizona Public Service Company intensifying improvement efforts. Their customers are getting top-rate service as elaborate microwave system guarantees correct relay operations.

By T. A. Phillips, Vice-President Engineering, Arizona Public Service Co., Phoenix; and S. Lapenson, Commercial Electronic Products, Radio Corporation of America, Camden, N. J.

◆AS THE GREEN of residential areas and farmlands has taken the place of cactus and mesquite in booming Arizona, the operations of the Arizona Public Service Company have increased to cover ten of the state's 14 counties—including 60 per cent of the state's population. With its many new plants and newly-strung high-tension lines carrying electric power into the far corners of the state, dependable communications are a "must" to assure customers in these areas with the very best in electrical service.

The Company's microwave system, which forms the backbone of an elaborate communications operation encompassing 40,000 square miles of service area, is not only a dependable communications medium, but a highly flexible one as well. In dependability, it has consistently logged reliabilities in the high ninety's, while its flexibility has been demonstrated in the convenient manner by which it has been extended across the state to cover the utilities expansion through the years.

The elaborate communications system is part of a $130,000,000 program in new construction. During the dynamic decade from 1945 to 1955, the company's microwave facilities, which had started as a small three-station system in the Phoenix area, mushroomed into a

demand

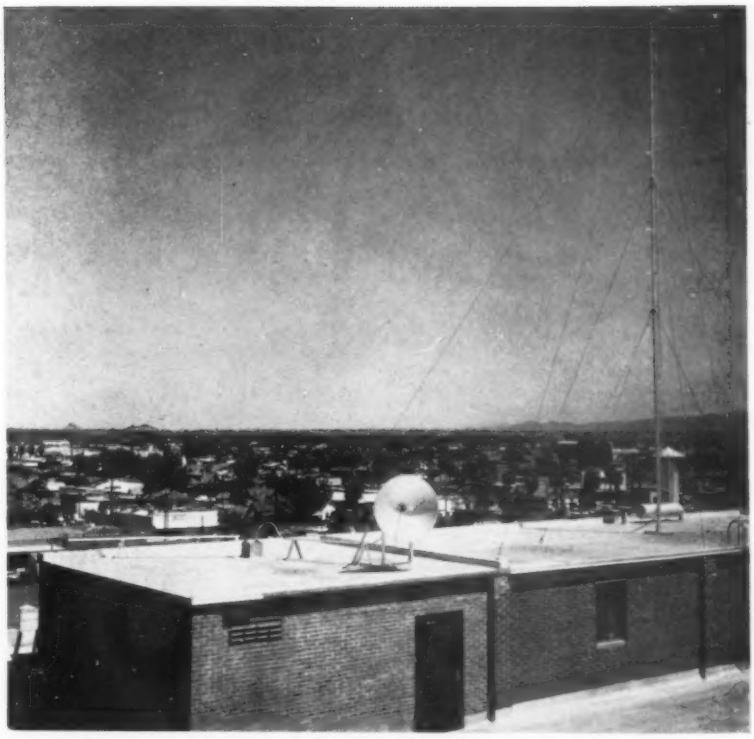
27-station system, to encompass a service area from the Mexican border on the south, to the Grand Canyon and Indian country in the north, and east from the Petrified Forest to the Colorado river on the west.

How microwave system started

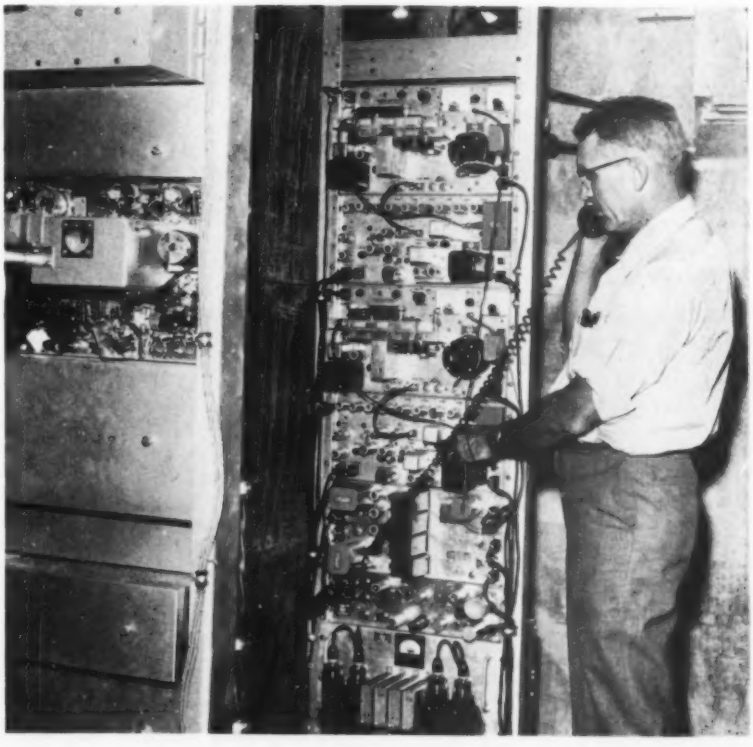
When the need for an integrated communications system developed, Arizona Public Service's Engineering Department undertook a careful study to determine the operational and economic advantages of various communications methods. Results of the study, which considered the Company's specific requirements, weighed heavily toward microwave. Economic factors, for example, favored microwaves by a wide margin. But lower cost was not felt to be the only asset. The microwave's excellent characteristics from the standpoint of its relative freedom from noise and distortion, ability to combine with mobile communications, reliability, relative ease of maintenance, and the availability of a wide spectrum to support expansion were carefully considered.

Carrier versus microwave

Where a multiplicity of communications channels are required, microwave was found to offer a practical method of adding or dropping channels in large numbers once a link is established. Also, even though the Company already has existing wire strung between supervisory units, the nature of the Company's system would have required a considerable number of two-frequency line traps, plus expensive coupling capacitors and line terminating units for its high tension lines. Results of these studies led the Company to install its first three-station microwave system in 1949 between Phoenix, Litchfield, and Bell Switch. This system proved to the Company that microwave would meet exacting demands for dependability and performance. Therefore, an additional system



Microwave systems terminate at penthouse room of Phoenix station. The building roof contains both microwave and VHF antennas.



Company supervisor in the Protection and Communications Department uses service channel to contact another system station.

was added in 1953 from Phoenix to Winslow. This leg covered 210 miles and provided additional VHF control channels as well as voice channels. The following year, another leg of approximately 150 miles was added from Phoenix to Saguara. Then, in 1955 a 175 mile addition took the system from Phoenix to Yuma.

More than 225 mobile vehicles equipped with two-way radio help to extend the range of the microwave system, so that in effect, today the Company's radio facilities adequately cover the vast 40,000 square mile service area.

Operation like light beams

Its first microwave link, installed in 1949, marked an important transition from conventional practice. Microwaves, for example, are like light beams in many respects. They may be focused in narrow beams, much as light is focused in a searchlight. Parabolic reflector-type dishes, which serve as receiving and transmitting antennas, bounce the beam from one point to another, spanning distances on the order of 30 miles between stations. In Arizona's system, favorable mountain-top terrain made it possible to span more than 70 miles between stations.

An important characteristic which contributes to their dependability is the fact that microwaves function best during storms which normally tear-down wire lines. Air turbulence actually improves microwave performance. A relative newcomer on the communications scene, microwave has proven itself to be a highly dependable medium with consistently dependable performance.

Description of system

Phoenix serves as an important pivotal point in Company operations and is, therefore, an important terminal and junction point of the microwave system. Communications from all parts of the state are funneled into the Company's Phoenix office, and incoming traffic is routed from the penthouse radio room to the radio rooms in the same building. Microwave traffic from outlying steam plants and substations, maintenance and construction crews, and from distribution points flows into Phoenix in a continuous stream to guide officials at the home office in exerting proper supervisory and administrative control of the electrical network.

On a map, the over-all microwave system takes the form of a huge inverted Y with Phoenix at the fork. Phoenix is situated in a valley and looks out toward formidable mountains on the North and West. The microwave system makes advantageous use of local terrain. A microwave station on top of nearby White Tank Mountain, aligned directly down on the terminal in Phoenix, relays the signals on to its Western Division. Another station on Shaw Butte Mountain relays the signals from both the Northern and Southern Divisions of the system down to Phoenix by a short ten-mile hop. The advantageous use of mountain locations throughout the system has made possible such long distance hops as one of 77.5 miles between Shaw Butte and Mingus, and another of 73.3 miles between Oatman Mountain and Telegraph Pass.

On the Northern leg of the Y, a combination of VHF, conference, and dial channels from Winslow combine with telemetering channels and additional voice circuits at Mount Elden. From here, the signals are relayed to another junction at Mingus Mountain where additional channels are picked up from Cottonwood and Prescott and relayed on to Phoenix. The use of one basic eight-channel multiplex group carries most of the traffic.

On the Western leg, voice, supervisory, and telemetering channels are relayed from Yuma to White Tanks. En route, VHF channels are inserted at Telegraph Pass, Oatman Mountain and White Tanks. At the latter station, six additional telemetering and supervisory channels, as well as a voice channel, are added to the system.

On the Southern leg, which extends from Phoenix to San Manuel, Sacaton Pass serves as an important junction with Casa Grande and the Company's Saguara plant. The entire leg is operated through a "B" translator which stacks channels in the 5-8 kc to 32.8 kc range at approximately 4 kc intervals. At Sacaton, a 53.46 mc VHF link is dropped while eight narrow band channels carry supervisory and telemetering data from the Saguara and Casa Grande plants back to Phoenix. One narrow band channel is provided from supervisory control.

Supervisory control functions

Supervisory control equipment operated over the microwave link performs selections, control operations, and transmits indications by means of separate codes. Each of these codes consists of a specific number of electrical impulses of uniform length, with time intervals of either short or long duration between pulses.

At the Phoenix and Prescott installations, switchboard units provide individual lamps and key groups for each supervised unit, a set of 'common' operating lamps and keys, and supervisory relays. Each supervised unit has its own lamp and key group which provides:

(1) A push-button select key to initiate control equipment set-up.

(2) Red and green indicator lamps to provide continuous indications of supervised unit, and to flash change-over indication.

(3) An amber lamp to indicate supervisory equipment has made a selection, and is ready to transmit operating signals.

Lamp and key groups on the 'common' circuit provide the following:

(1) Two master push-button type keys with which operator controls a selected unit.

(2) A green start-lamp to indicate normal-at-rest position of equipment.

(3) A red alarm-lamp and bell to indicate supervisory equipment operating originates from an outlying station.

(4) A push-button type bell key which extinguishes alarm lamp and silences alarm bell, but does not stop flashing of individual unit indicating lamp.

(5) A push-button type reset key which resets equipment to normal - at - rest conditions, and stops flashing of individual unit indicating lamp.

(6) A push button check key which causes equipment to check position of any selected supervisory unit, or to perform a station check operation if pressed when equipment is in normal-at-rest position.

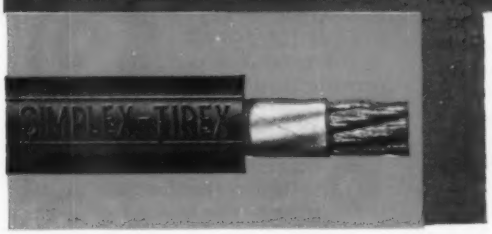
Efficient company operations

In the Arizona Public Service communications system, microwave and two-way radio are effectively combined to bridge vast distances of the state in split seconds and to weld the far-flung electrical system into an efficient operating unit. To provide better service for its customers, the system provides separate channels for

(Continued on page 97)

The Burning Question . . .
of how to attain better welding efficiency is answered by the new, improved flexibility of SIMPLEX TIREX WELDING CABLES. These expertly designed cables are easier to work with, easier to handle. Their jacket of cured-in-lead Neoprene Armor is the toughest known – engineered against damage by abrasion, oil, heat and water. Be sure – specify TIREX WELDING CABLES. Order from your distributor; or for complete data, write for Booklet 1011.

SIMPLEX WIRE & CABLE CO.,
79 Sidney St., Cambridge 39, Mass.



LIVE BETTER ELECTRICALLY

Simplex – TIREX

Three phase residential service

An extensive survey of practices of southeastern companies with respect to three phase versus single phase service for residential customers indicates a lack of uniformity among companies, but does show increasing interest in three phase service for this application.

By Robert C. Daffron, System Distribution Engineer, Virginia Electric and Power Co., Richmond, Va.

◆ THE EVER INCREASING demand for residential service for summer cooling, which has stemmed mainly from the use of easy-to-install window type air conditioners, has presented problems in many fields of utility operation.

Customer acceptance of this form of cooling in existing homes has been accompanied by a constant demand for centrally located air conditioning units and year-round air conditioning by the heat pump, in newly constructed homes. Expected increases in this load pose an additional problem: Shall this service be furnished at single or three phase?

The increased use of heat pumps and central air conditioning units in residences throughout the southeast makes the subject of three phase versus single phase service for residential use one of considerable importance. Centrally located units for summer and year-round air conditioning are rapidly increasing in number. This growth will affect all phases of utility operation. The problem affects not only the utilities supplying the service, but the customers, equipment manufacturers, and dealers as well. In the case of the manufacturers it is a question of standardization which, of course, will result in lower cost and that is where our customers are most concerned. In the case of the utilities, with which we are mainly concerned, it is both a distribution engineering and a rate problem.

Economic factor

The answer to the single phase versus three phase question is, of course, being determined by the economics of supplying such service, coupled with local rate policies. On this point everyone agrees, but when we go beyond the simple statement that the solution must be the economic one, the agreement ends. Economics is defined as a science but unfortunately it is not an exact science. There are many factors to be considered in the selection of single or three phase service for residences and the solution reached is directly affected by which factors are included in the problem. At the present time any solution reached is controversial to say the least. Your Program Committee was of the opinion that a survey and report on practices and policies of member companies in connection with the supply of three phase service to residential customers could be helpful in the development of a more uniform policy.

Present company practices

A questionnaire was sent to all member companies through the Exchange Office. Several questions pertaining to services were included in the survey which did not pertain directly to the problem of three phase versus single phase service, but would be of general value to the engineering personnel of the member companies. Twenty replies were received. In the preparation of the questionnaire special care was taken to formulate the questions in such a manner that the results could easily be tabulated and summarized in order to establish a pattern for the various companies. A preliminary tabulation of answers by responding companies indicated that there is no uniformity of practice among the member companies. However, further analysis of the data does show something of a general pattern.

Seventeen of the twenty responding companies provide three phase service under the residential rate schedule. Of the other three companies, two stated that three phase was not available under any circumstances. The one remaining company will make it available only under a general service rate.

Twelve of these seventeen companies that provide three phase service make no additional charge for it as part of the residential rate; that is, over and above contributions in the aid of construction. The five other companies make flat surcharges on a monthly basis or additional charges commensurate with either registered demands or connected loads.

When three phase lines are not immediately available, three phase service will be provided by thirteen companies under a plan of customer contribution to the construction of the necessary lines. Eleven of these companies make no refund of the contribution to the customer. The other two companies have plans for refunding after new customers are connected to the specially-built line. In the case of two other companies, which require a guaranteed minimum monthly charge when three phase service is furnished, adjustments are made to the minimum when additional customers are served from the three phase line. The wide variation in practices in regard to additional charges to customers is possibly a carry-over from agreements for line extensions.

From the above, it is quite evident that serving a residential customer with three phase service is complicated, requires additional accounting and may result in excess cost to the customer.

With one exception, three phase residential service is usually supplied at 120/240 volts, 4 wire. None of the seventeen companies which provide three phase service meter it separately.

Motor size limitations

With respect to limitations on the minimum size motor for which

How twenty Southeastern companies replied to questionnaire on single-phase versus three-phase for residential service

Question		Number Companies
1. What is the minimum size 3ϕ motor that will be served when:		
a. 3ϕ secondary is available?	No minimum	4
	3 hp	9
	5 hp	4
	3ϕ not available	3
b. 3ϕ primary is available?	No minimum	2
	3 hp	4
	5 hp	11
	3ϕ not available	3
2. What is the maximum size 1ϕ motor allowed when:		
a. 3ϕ secondary is available?	No limit	1
	10 hp	1
	7½ hp	2
	5 hp	9
	3 hp	4
	Below 3 hp	2
	Did not answer	1
b. 3ϕ primary is available?	No limit	1
	15 hp	1
	10 hp	1
	7½ hp	3
	5 hp	8
	3 hp	5
	Did not answer	1
c. 3ϕ primary is not available?	No limit	1
	15 hp	2
	10 hp	4
	7½ hp	2
	5 hp	7
	3 hp	2
	Consult company	1
	Did not answer	1
3. Does your residential rate provide for 3ϕ service?	Yes	17
	No	3
4. If 3ϕ is provided to residences, is charge made and how much? (This is in addition to construction aid contribution).	No	12
	Yes	5
	3ϕ not available	3
Note: Of the 5 yes answers: Two have a flat surcharge ($1 and $2 per month). The other three companies base their charges on demand or connected load.		
5. a. Under what conditions will you provide 3ϕ when a 3ϕ line is not available?	Guaranteed minimum	2
	Surcharge	2
	Contribution to aid construction	13
	3ϕ not available	3
b. If customer is required to make cash outlay are any provisions made for refunds; or adjustment when additional 3ϕ customers are added to the same facilities?	No refunds	11
	Make adjustment or refund	3
	No outlay required	3
	3ϕ not available	3
6. What is your usual 3ϕ residential supply voltage?	120/240 volt, 4 wire	16
	120/208 volt, 4 wire	2
	3ϕ not available	3

Question		Number Companies
7. Do you install or pay for any wiring on customer's building?	No	14
	S/E cable on 100 amp. 1ϕ service	1
	S/E cable to outdoor meter	1
	All conductors to meter	3
	Partial payment for wiring on ranges, water heaters, bathroom heaters, heat pumps	1
8. Is 3ϕ service metered separately?	No	17
	3ϕ not available	3
9. What type of 3ϕ meter do you use for residential service?	Socket	11
	A-base	5
	3ϕ not available	3
	Did not answer	2
10. What size and type of service drop conductors do you use?	Triplex	13
TYPE	Open wire	10
	Service cable	2
	Quadruplex	7
	Did not answer	1
	Neoprene	16
COVERING	Polyethylene	5
	D.B.W.P.	2
	T.B.W.P.	3
	Did not answer	2
	#6	5
SIZE 60 AMP SERVICE	#4	16
	#2	2
	Did not answer	3
	#6	2
SIZE 100 AMP SERVICE	#4	11
	#2	8
	#1/0	3
	Did not answer	2
MATERIAL	Copper	5
	Aluminum	14
	ACSR	1
	Al. - ACSR	3
	Did not answer	2
*Triplex with Al. phase wires and ACSR neutral.		
11. Do you have any power factor requirements for residential service? If yes, please explain.	No requirements	13
	Require 90% or better	2
	Require 85% or better	1
	Require 80% or better	1
	Prohibit low power factor lighting and window air conditioning units	2
	Did not answer	1
12. Do you have any motor starting current limitations? If yes, please explain.	No limitations on motors of 5 hp and less	5
	Have starting current limitations	17
	Different limitations for frequently started motors from those infrequently started	5
	Did not answer	1
13. Do you use secondary capacitors? If so, please number in order of their importance (1,2,3, etc.) your reasons for their use.	Do not use	8
	Did not answer	3
Order of Importance:	Secondary voltage improvement	
	Reduce flicker	
	Release transformer capacity	
	Improve system power factor	

three phase service will be provided, the following was reported:

(a) When three phase secondary is available, 9 companies reported 3 hp as the minimum, 4 companies reported 5 hp and the other 4 companies had no minimum motor size requirement.

(b) When three phase primary is available, 11 companies reported 5 hp as the minimum, 4 companies reported 3 hp and 2 companies had no minimum motor size requirement.

Thirteen companies will supply three phase for a 3 hp motor when three phase secondary is available but when it is necessary to hang additional transformers seven of these companies require the installation of a 5 hp motor in order to obtain three phase service. Under this policy the dealers would have to carry both three phase and single phase units in the 3 hp size.

In regard to the maximum size motor allowed on single phase service, 19 companies reported:

(a) When three phase secondary is available, 9 companies stated 5 hp as the maximum, 4 companies reported 3 hp, 2 companies less than 3 hp and 3 companies between 7½ and 10 hp. One company had no limitation as to motor size.

(b) When three phase primary is available, 8 companies stated that 5 hp is the maximum, 5 companies reported 3 hp, 5 companies between 7½ and 15 hp and 1 company had no limitation.

(c) When three phase primary is not available, 7 companies stated that 5 hp is the maximum, 2 companies stated 3 hp, 8 companies stated limitations varying from 7½ to 15 hp, 1 company had no limitations and another suggested that the company be consulted.

Lack of uniformity

Obviously, there is no uniformity as to motor size requirements, minimum or maximum, under three or single phase service conditions. We presume this large variety of limitations is due to local company opinion and load conditions on the distribution systems. There is a certain significance to the fact that 5 and 3 hp motor size limitations appear predominant in most of the answers to these questions. Only two companies limit the size of a single phase motor to 3 hp when three phase primary is not available. This would indicate that all but two of the reporting companies consider 5 hp motors on single phase as satisfactory operation.

In our opinion, there is a definite pattern in the responses to the other questions regarding three phase residential service:

(a) A majority of the twenty responding companies furnish three phase service for residential use.

(b) Of those that furnish it, a majority require that the customer make a contribution in aid of construction of lines and allow no refund.

(c) The voltage of three phase service is practically standard at 120/240 volts.

(d) Three phase service is never metered separately.

Sometime ago, a similar questionnaire regarding policy in the supplying of three phase residential service was submitted to thirty-eight companies throughout the United States. Exactly one-half of these companies applied a rate different from the standard residential schedule when three phase service is furnished for domestic use.

The maximum size single phase motor served under the residential rate is predominantly 5 hp. It is interesting to note that over a third of these companies either discourage or do not encourage three phase service for residential purposes. An examination of comments regarding company policy in furnishing three phase service for residential loads discloses about the same lack of uniformity as appeared from our questionnaire.

The purpose of the question concerning company wiring on the customers building was to determine if the furnishing of the service entrance affected the decision to provide single or three phase service. Since only six companies have a plan for installing any part of the wiring on the customers building, no pattern could be established.

Other considerations

The answers to the question on service drop conductors revealed that thirteen of the nineteen reporting companies are using triplex cable. All reporting companies are using polymer (neoprene or polyethylene) coverings on the conductors. On 60 ampere services, wire sizes range from #6 aluminum to #2 aluminum, or the copper equivalent. On 100 ampere services the range is from #4 to #1/0 aluminum, or the copper equivalent. All companies are using aluminum for service conductors with five companies still using copper in some cases.

Thirteen of nineteen reporting companies have no power factor requirements for residential service. The other six have varying policies requiring minimum power factors to be from 80 per cent to 90 per cent. No information was given on the methods of enforcing the power factor requirements.

Seventeen of nineteen companies reported that they have starting current limitations. Five companies have no limitations on motors of 5 hp and less. Five of the companies have different limitations on frequently started motors from those of infrequently started motors. There was as much variation in starting current limitations as the requirements for obtaining three phase service.

Nine of the seventeen reporting companies use secondary capacitors. The majority listed secondary voltage improvement as the principal reason for their use. The other reasons for their use, in order of their importance, are: release of transformer capacity, reduction of flicker and improvement of system power factor.

From the survey results it can be seen that there is little uniformity of practice among the southeastern companies in supplying three phase residential service.

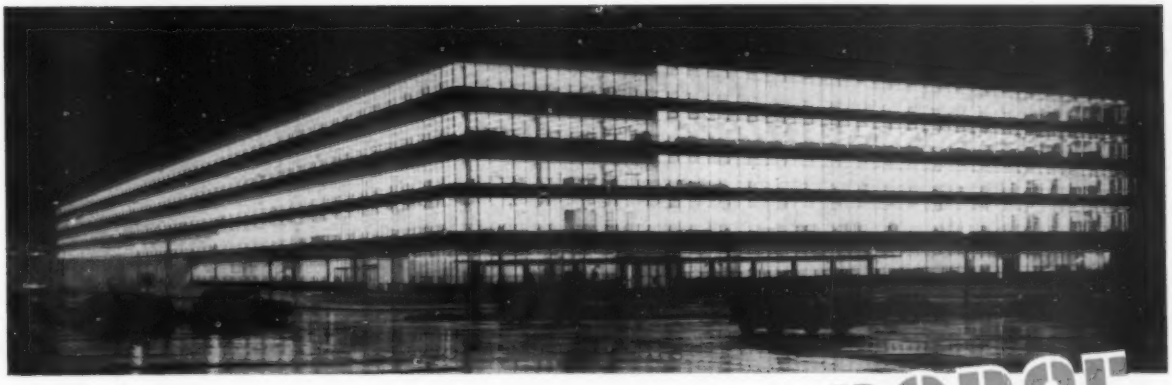
The most prevalent sizes of motors for residential air conditioning units are 2 hp, 3 hp, and 5 hp. Several years ago the addition of a motor of one of these sizes would have made the motor the largest part of the customers load. Today these motors, in most cases, constitute a small part of the total load on a transformer. The acceptance of large inherently single phase appliances such as ranges, clothes dryers and quick recovery water heaters is increasing the single phase load materially and makes the addition of a 2, 3 or 5 hp motor a matter of less importance.

From the customer's point of view, he is primarily concerned with the cost and satisfactory operation. The cost to the customer is approximately $70 to $100 less for a three phase heat pump or air conditioning unit than for a single phase unit. The wiring for the three phase unit will cost the customer approximately $40 to $50 more than that for the single phase unit, which will make his net saving from $20 to $60. The extra cost of single phase motors is caused in part by the need for starting and running capacitors and starting relays. If the running power factor of three phase motors were made equal to the running power factor of single phase motors the net cost of the three phase units would increase.

As far as operation of heat pumps is concerned there is no difference in the power input requirement for single and three phase units with the same Btu per hour output. The same is true for air conditioning units; there is very little difference in kw input between the single and three phase.

The additional cost to the utility to supply the air conditioning units three phase requires a great deal of careful analysis. According to a recent report of a large utility engineering company, the net overall investment per unit installed should be less for single phase with the saving being considerable at low saturations and somewhat less for higher saturations. For example, for 4% saturation, the saving to the utility for single phase as compared to three phase would be $350 per unit. Deducting the customer's added cost of $35 for single phase equipment as compared to three phase, the net saving in investment is $315. Even at 100% saturation, the utility saving for single phase over three phase is $70 per unit, leaving a net saving of $35 per unit after the customer's extra cost of $35 is deducted.

New Home for Army Service Records



WIRE BY PHELPS DODGE

This modern AG Record Center building* in St. Louis, Mo., is virtually an oversized glass filing cabinet. Housed here are service records of 20,000,000 persons who have served in the Army or Air Force since the Civil War.

A dependable wiring system was an important part of the building's specifications. That's why Phelps Dodge wire and cable was installed.

On every wiring job, where top-quality materials, expert workmanship and experienced "know-how" are called for, *it pays to rely on Phelps Dodge and your Phelps Dodge distributor!*

*Joint General Contractors: Fruin-Colnon Contracting Co., St. Louis, Mo., and Peter Kiewit Sons' Co., Omaha, Neb., Electrical Contractor: Mack Electric Co., St. Louis, Mo.

PHELPS DODGE COPPER PRODUCTS CORPORATION

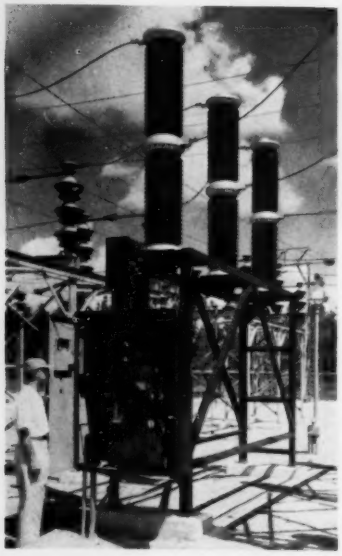
SALES OFFICES: Atlanta, Birmingham, Ala., Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

Notes on new utility equipment

Westinghouse gas-filled power circuit breakers

THREE OF THE FIRST experimental gas-filled (SF6) power circuit breakers ever built, developed by Westinghouse Electric Corporation, have been installed at the Gulf Power Company Pace substation, Pensacola, Fla., to obtain performance data.

These breakers, rated at 115 kv and 1000 mva, have a continuous current rating of 400 amperes rms, will interrupt in 5 cycles, and reclose in



less than 15 cycles. The SF6 breaker is restrike free, which makes it particularly well adapted for switching capacitors, either single bank or bank against bank.

The gas has excellent insulation properties and is used at relatively low pressure (45 psig). A porcelain housing is used for the enclosure. The upper half of the porcelain-clad pole unit contains the interrupting device, and the lower half provides insulation to ground.

Three curved, double-armed, U-shaped moving contact castings are mounted on a rotating shaft and mate with six stationary contacts to provide a total of six breaks per phase. The breaks are formed within an insulating tube in which the stationary contacts are located and through which the arms of the moving contact pass. The short stroke and small amount of closing energy required of this breaker allows eleven closing operations without going below minimum closing pressure with the standard pneumatic operating mechanism.

Each pole unit is approximately nine feet high by one foot wide and weighs approximately one thousand pounds.

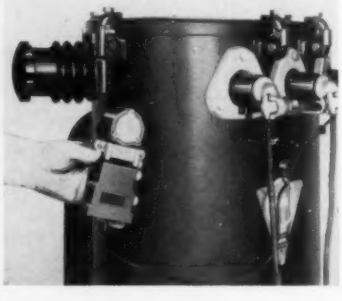
For additional data, ask for item U-201, using the coupon on page 95.

Magnet mounting device for overload indicators

L-M TRANSFORMER thermal overload indicators are now available with an Alnico permanent magnet mounting device from the Line Material Co., Milwaukee 1, Wis.

The new mounting device facilitates installation on transformers in service. Indicators can be placed near the top oil level, in any convenient location around the tank. The magnet will not slip or creep.

The indicators are externally-mounted devices that give a visual signal when top oil temperature is too high. Two types of indicators are available; one, giving signals by means of a red light in a drop-out



tube, while the other utilizes a luminous drop-out tube.

Indicators can also be supplied with a stainless steel spring wire for mounting on transformers in service. New L-M round-wound transformers have a mounting bracket welded to the transformer tank.

For additional data, ask for item U-202, using the coupon on page 95.

Class-200 meter gives 'straight-line' accuracy

ADDITION of a new Class-200 meter to its line of extended range Type MK single-phase watt-hour meters is announced by Duncan Electric Co., Lafayette, Ind.

This meter provides capacity for measuring loads to 200-amperes with

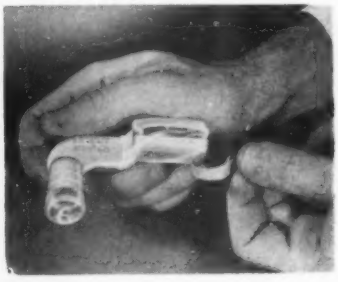
"straight-line" accuracy. The development and offering of the meter is in line with the present trend toward larger services for handling anticipated future loads.

The new Duncan MK meter supersedes the Type MF-SE single-phase meter with which it pioneered the Class 200 rating over seven years ago. The new meter incorporates features which are a part of the basic MK construction made available in 1953: molded, arc-resistant insulation in the electromagnet; self-contained arc gaps to by-pass electrical disturbances; Alnico V permanent magnets to resist calibration changes; and microset adjustments, all accessible for operation from the front of the meter.

For additional data, ask for item U-203, using the coupon on page 95.

Joint compound included with L-type connectors

BURNDY Corp., Norwalk, Conn., has recently introduced Stripsealed Eltaps, L-type compression connectors, having both run and tap elements factory-filled with Penetrox A, oxide-penetrating, corrosion-preventing



joint compound.

Burndy engineers have concluded that most electrical connection failures involving aluminum are trace-

One in a series to emphasize the economy of Electrical Wholesale Distribution

"Shucks, Rajah, this is nothing compared with the torture electrical users who buy direct put themselves through."

"Electrical Wholesaler Distribution reduces the Manufacturer's selling cost and thereby reduces the selling price of electrical supply material to the user. Therefore, our policy has been to distribute Thomas & Betts products exclusively through the Electrical Wholesaler."*

LOOK FOR THIS SIGN — AUTHORIZED DISTRIBUTOR T&B ENGINEERED

IT'S THE MARK OF AN AUTHORIZED **T&B** DISTRIBUTOR

THE THOMAS & BETTS CO.

INCORPORATED

72 BUTLER STREET, ELIZABETH 1, NEW JERSEY

THOMAS & BETTS, LTD., MONTREAL, P. Q., CANADA

MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898

*Quoted from the T & B Plan of Wholesaler Distribution. If you would like to know the complete story of the T & B Plan, write:

able to nonuse of the compound and have developed Stripsealing so that Penetrox A will be applied automatically as connectors are installed.

In this process, a special plastic dip applied directly over the joint compound seals-in the proper quantity on the connector contact surfaces. The dipping operation's duration and temperature are controlled to avoid compound melting and to form perfect seal. On installation of the Stripsealed connector, the lineman strips the seal by pulling a rip tape, color-coded for cable-size identification.

Stripsealed Eltaps are available for run conductors from #6 to #2 and taps from #10 to #2. Besides protecting aluminum connections from corrosion, Stripsealing saves installation time by eliminating need for the lineman to scratch brush connectors, preventing connector oxidation during storage or in transit, and assuring use of the proper joint compound for each connector type.

For additional data, ask for item U-204, using the coupon on page 95.

70-amp main breaker bridges former gap

A 70-AMPERE all-in-one meter socket-load center, bridging the gap between 50- and 100-ampere service entrance requirements, has been announced by the Circuit Protective Devices Dept., General Electric Co., Plainville, Conn.

This new device highlights General Electric's new expanded line of seven meter socket-load centers. The "all-

in-one" design of these devices provides extra installation and servicing convenience for areas where the electrical contractor needs to supply the meter socket, and where outdoor location of the service entrance equipment is desired.

Utilizing a wired-in, 2-pole, common-trip, 70-ampere Type TQL main circuit breaker, the new 70-ampere load center permits savings to contractors who formerly had to jump to 100-ampere service equipment when a 50-ampere box proved inadequate. This device eliminates the need for a separate main disconnect, and has space for 14 single-pole branch circuits which includes capacity for up to three double-pole branches to feed ranges, dryers, or other 240-volt appliances. It has been tested and approved by the Department of Building and Safety, Los Angeles.

For additional data, ask for item U-205, using the coupon on page 95.

Maximum kva demand meter designed by Westinghouse

A WATT-HOUR thermal-demand meter, type QDS, designed by Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa., indicates kilowatt-hours used and also the maximum kva demand. Kilowatt-hours are recorded by a single-phase watt-hour meter element. The kva demand is indicated by a thermal unit that operates on a logarithmic principle.

The thermal unit consists of two bi-metal springs, wound in opposite direction to compensate for ambient temperature changes, and mounted on a common shaft. One bi-metal spring is enclosed by a heater which is fed from the secondaries of two current transformers. The primaries of these current transformers are the series windings of the watt-hour meter. Consequently, the amount of heat applied to the bi-metal spring is proportional to the current drawn by the load. When heated the bi-metal spring rotates and indicates on a scale the maximum demand during the period. By assuming a constant line voltage the scale can be marked in kva and thus give the maximum kva demand during the billing period. The thermal unit functions independently of the watt-hour element and is designed to reach 90 per cent of its final value for a constant load in 15 minutes.

For additional data, ask for item U-206, using the coupon on page 95.

Rotary scale volt-ammeter with built-in range selector

A COMPLETELY NEW snap-around type volt-ammeter, the RS-1 Amprobe, is being introduced by the Pyramid Instrument Corp., of Lynbrook, N. Y.

This new Amprobe with its built-in recessed range-selector permits selection of any one of 4 ampere and 2 voltage ranges by just a flick of the thumb. Since only one current scale or voltage scale is visible at any time, speed of reading is increased and chance of error is minimized.

The RS-1 model Amprobe has many other new features including: a magnifying-glass covered dial; a longer needle sweep; a Pointer-Lock

to lock the needle in place when taking a reading in a difficult location, simple bayonet voltage leads that lock-in at bottom for quick connecting, impact-proof case that won't chip or crack with non-slip ribbing that gives it a firm pistol-grip, advanced printed circuit construction and shielded core magnet movement that mean trouble-free operation and longer service life.

The Amprobe RS-1 can be used for current measurement without cutting conductors. It is a convenient instrument for balancing circuits, tracing faults and grounds, an aid in estimating new or revised distribution circuits, diagnosing operating troubles without shutting down equipment or premises, etc.

For additional data, ask for item U-207, using the coupon on page 95.

Polyphase watt-hour meters introduce new features

A NEW LINE *of* polyphase watt-hour meters featuring extended range, magnetic suspension, and surge protection is being introduced by General Electric Co., Schenectady 5, N.Y.

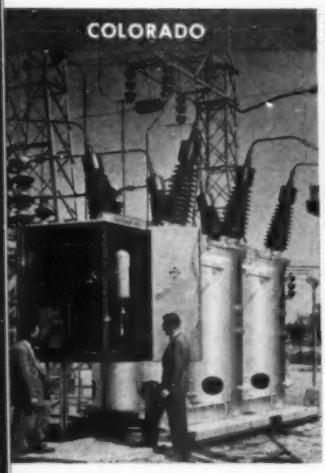
First-born in the "V-60 family" is a network meter, designated the V-62, which will be available in both Class 100 and Class 200 ratings.

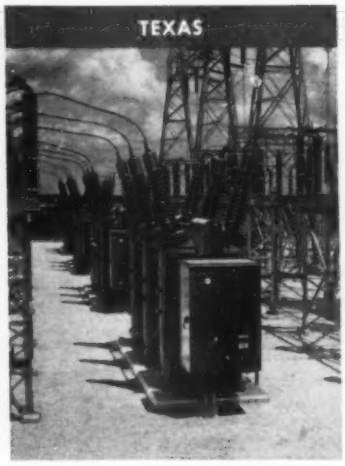
With the extended range of the V-62, meter replacement is unnecessary as polyphase loads grow. Loads up to 200 amperes can be metered without the need for current transformers.

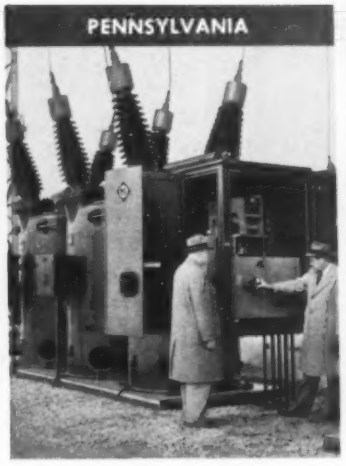
The magnetic suspension feature —heart of the company's I-50, I-55 single phase types—minimizes loss of revenue due to tilt error, eliminates the need for bearing replacement, and provides the greatest sustained accuracy of any polyphase meter now in use, said engineers of the company's Meter Department in Somersworth, N. H.

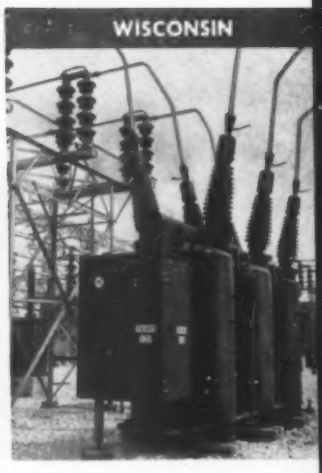
Co-ordination of surge relief gaps and butyl-molded insulation in the new meter cuts down on lightning

Utilities everywhere like Pneu-Draulic operators

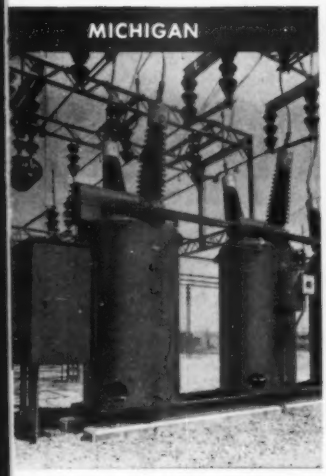


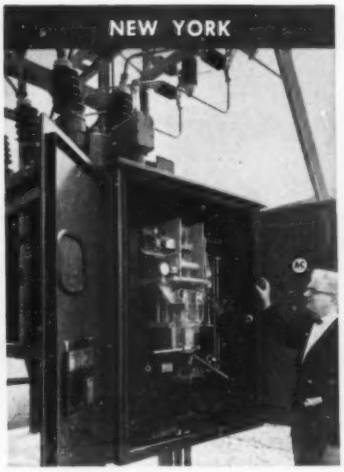


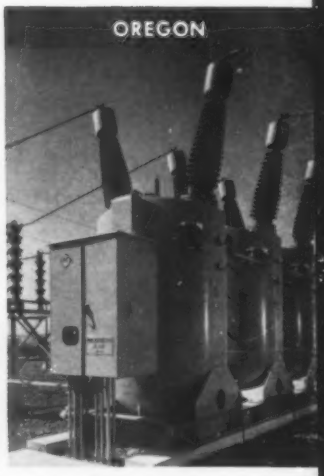




for their simplicity, reliability







***Pneu-Draulic* operators offer Utilities many advantages:**

- Simplicity — Compact design with few moving parts.
- Eliminates moisture, and corrosion problems — Entire system filled with oil containing inhibitor which eliminates rust, freezing and corrosion.
- Safe emergency closing — Breaker can be closed *safely* at full rated speed onto energized line even when no control power is available.
- Mechanically trip-free operation — Fully mechanically trip-free for complete system protection.
- Available on a wide range of breaker ratings — Breakers rated 500 mva and larger use the *Pneu-Draulic* operator as standard equipment.

Get details on these and other features of Allis-Chalmers breakers. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

NATIONAL ELECTRICAL Week
FEB. 10-16, 1957

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Pneu-Draulic is an Allis-Chalmers trademark.

A-5205

damage and meter burn-outs. The gap system provides outstanding surge current relief, the meter engineers said.

The voltage stability of the V-62

provides accurate registration with circuit variations from 50 per cent to 130 per cent of rated voltage. This allows a standard 240-volt V-62 meter to be used on 208, 240, and 277 volt systems, eliminating the need to stock meters for odd voltages.

A new positive lag adjustment, which has no effect on light load adjustment, helps eliminate time lost in test because of interaction of adjustments. Simple screw driver adjustment of full, lag, and light load can be made from the front of the V-62 to further reduce test loss time.

For additional data, ask for item U-208, using the coupon on page 95.

Electrical connector series reduces clamp inventories

A SERIES of electrical connectors recently developed by Aluminum Company of America, Pittsburgh 19,

Pa., now makes possible a major reduction of conductor clamp inventories. Heavy-duty U-bolt clamps, employing universal, parallel spacer grooves, now can be used on a wide range of cable sizes.

The six Alcoa clamps, designated 580 Series, can be used on ACSR from #2 to 715.5 mcm, and will also handle sizes #2 to 800 mcm stranded aluminum conductor. All proportions —length of clamps, number of bolts, bolt sizes—are engineered for the range of conductor size to be accommodated and the job to be done. The U-bolt portion, flattened to reduce bulk, provides wrap-around strength and even pressure distribution.

Easy to install and maintenance-free, the clamps' generous dimensions impart added strength and reliability. Paramount qualities of resistance to corrosion and long life are assured by all-aluminum construction.

Proven during many months of Alcoa laboratory testing, the clamps have undergone a thousand heat cycles using various conductor combinations. Test currents produced conductor temperatures of 200 degrees F. with no significant change in connection resistance.

For additional data, ask for item U-209, using the coupon on page 95.

Waist belt supporter has adjustable snaps

MATHIAS KLEIN & Sons, Chicago, announces the development of a new waist belt supporter. This supporter,

commonly referred to as a gut strap, has four-point suspension with four separate snaps. Each strap is provided with a buckle to permit easy adjustment. It is made of finest quality harness leather in sizes 36" to 46".

For additional data, ask for item U-210, using the coupon on page 95.

Angle cross arm sheave pulls cable around corners

A NEW angle cross arm sheave, especially designed for pulling cable around corners, is announced by T. J. Cope, Inc., of Collegeville, Pa. The free-running, generously proportioned sheave is mounted in an easily-attached steel yoke and will greatly facilitate installation of aerial cable.

The Cope angle sheave is adjust-

able to any angle up to 90°, permitting alignment to any angle of pull. It is available in two sizes: one to accommodate cables up to 3" in diameter, the second for cables up to 4" in diameter.

Sheaves are available in aluminum or malleable iron and are fitted with oilite bushings to reduce friction and eliminate frequent servicing.

For additional data, ask for item U-211, using the coupon on page 95.

Unit available to test high voltage detectors

A UNIT to test and assure dependable performance of stick type high voltage detectors has been announced by Multi-Amp Corp., 465 Lehigh Ave., Union, N. J., manufacturers of instruments for testing relays, circuit breakers, and related equipment used by light and power companies.

Known as the Accu-test, the two-part unit is wall-mounted at a point convenient to higher voltage area. When a button is pressed on the lower section, a red light indicates presence of test voltage. Electrode of the stick is then placed against brass plate beneath the top section of the Accu-test. The tube in the test stick glows, if in proper operating condition. Since the tester provides the minimum voltage at which tube will operate, its function on equal or high voltages is assured. The Accu-test operates on any 110-volt circuit and shuts off automatically after approximately a minute.

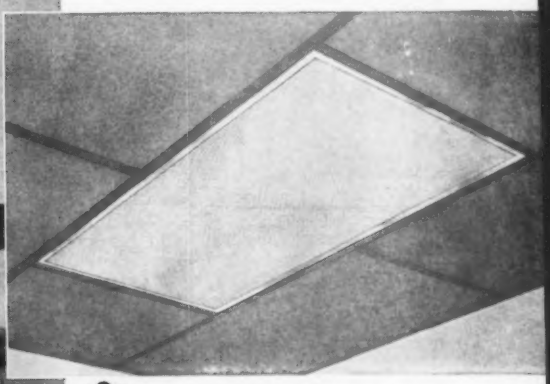
Tester advantages lie in its permanent accessibility, absolute accuracy of performance, and consequent safety. Errors possible with older type battery testers are thus eliminated.

For additional data, ask for item U-212, using the coupon on page 95.

* Arthur W. Siegel, Massachusetts Representative, one of Smithcraft's nationwide sales organization

. . . the man from *Smithcraft*

When you put his knowledge of lighting to work for you — in your office or on the job — your profit picture will quickly improve . . . you'll have the installation know-how you need to simplify any lighting job. His experience will help you apply the flexibility of Smithcraft's line of lighting units into time-saving, profitable solutions to lighting problems. Call him in to consult with you . . . you'll find he knows blueprints and budgets as well as he knows lighting!



. . . the 24" wide troffer from *Smithcraft*

Installation features that reduce costs to rock-bottom! Metro Troffers, 2 - foot wide, are simply placed on inverted "T" bars. Templex 2' wide Troffers are placed in opening and factory-attached hangers are automatically positioned on ceiling supporting members. Door frame is hooked on and closed (or opened) by simple upwards pressure. These features mean *profitable* jobs!

Smithcraft Troffers and other fine lighting units are installed in thousands of offices, factories, stores, schools and other types of installations from coast to coast. Wherever good lighting is important, you'll find . . .

SMITHCRAFT—"AMERICA'S FINEST FLUORESCENT LIGHTING."

Smithcraft
LIGHTING
CHELSEA 50, MASSACHUSETTS

PLEASE ATTACH TO YOUR BUSINESS LETTERHEAD and mail to *Smithcraft* LIGHTING, CHELSEA 50, MASS.

ES-2

NAME_____ TITLE_____

☐ Please send me the monthly publication, "Light Side of the News", so that I can keep in touch with the latest trends in lighting.

☐ Please send me "YOUR CEILING PLANNING COMES TO LIFE", a complete handbook on one and two-foot wide SMITHCRAFT ARCHITECTURAL TROFFERS.

☐ Please send me the complete SMITHCRAFT CATALOG, containing data on America's Finest Fluorescent Equipment.

News of the industry

edited for Southern readers

National trade show to electrify capitol

MORE THAN 7,000 members of the nation's electrical industry are expected to converge on Washington, D. C., February 12-14, for the first Electrical Trade Conference and Exposition ever to be held at the nation's capitol. The three-day convention is being sponsored by the Electric Institute of Washington and will be held in the spacious Shoreham Hotel.

Coinciding with celebration of National Electrical Week, the Conference will get officially underway on Tuesday, February 12, with a luncheon presided over by Merrill E. Skinner, National Electrical Week chairman and vice-president of Union Electric Company of St. Louis.

Tuesday luncheon speaker will be Oliver E. Burnett, National Electrical Contractors Association president and chairman of the board of Kelso-Burnett Electric Company of Chicago. Mr. Burnett will talk on "The Challenge of Electrical Expansion."

Tuesday afternoon Conference speakers will be Merwin Brandon on "Changes in the National Electrical Code," and Carl Bremicker on "Results and Future Plans—Live Better Electrically and Housepower Programs." Mr. Brandon is vice-president of the Underwriters' Laboratories and chairman, Electrical Section, National Fire Protection Association of New York. Mr. Bremicker serves as chairman of the National Adequate Wiring Bureau and vice-president of the Northern States Power Company of Minnesota.

Harry C. MacNary of Fischbach and Moore, Inc., New York City, will be speaker at the Wednesday, February 13, luncheon, discussing "Electrical Construction Trends."

Two forums will comprise the Wednesday afternoon program. "Government Specification Procedures" will serve as topic for the first panel of government specification personnel and well-known manufacturers; while panel members composing the second forum will tackle the subject of "Electric House Heating" and will be selected from the National Electrical Manufacturers Association's Electrical House Heating Section.

The program for Thursday, February 14, will include luncheon speaker Edwin Vennard on "The Electrical Utilities Part in the Industry's Electrical Expansion Program." Mr. Vennard is vice-president and managing director of the Edison Electric Institute of New York City.

Thursday's afternoon conference will be headed-up with talks on "An Architect Looks at the Electrical Industry" by Leon Chatelain, Jr., and "Commercial Lighting Progress in 1957" by J. H. McCulloch. Mr. Chatelain is president of the American Institute of Architects, while Mr. McCulloch serves as Progress Committee chairman of the Illuminating Engineering Society.

William G. Hills of the Electrical Institute of Washington is managing director for the Conference.

Hoheisel to head utility group in '57

ADVERTISING and Publicity Manager H. P. Hoheisel of the Oklahoma Gas and Electric Company has been elected president of the Oklahoma Utilities Association for 1957.

Other officers chosen by the Association's board of directors at its regular winter meeting included: first vice-president, Dale E. Frieden, president, Zenith Gas System, Inc., Alva; second vice-president, Wright Canfield, vice-president, Public Service Company of Oklahoma, Tulsa; and treasurer, H. H. Ferrin, vice-president and treasur-

H. P. Hoheisel

ATLANTA AGENT HONORED—Memorialized for his contribution to the electrical business in the Southeast, Howard K. ("Pete") Dewees of Atlanta recently found himself object of a surprise ceremony by friends in the electrical industry. Atlanta Mayor W. B. Hartsfield, left, hands Mr. DeWees an engraved loving cup, flanked by an electric percolator, circa 1930, which the latter introduced to Southern housewives. Filling the trophy are checks to the Shrine Crippled Children's Hospital, Mr. DeWees' favorite charity; donor's names will be engraved on cup.

Dispatchers of Northern States Power Company in Minneapolis have a running picture of load conditions across the company's 40,000 square mile area. Bell System private line channels carry data fast and accurately from all over the system to the operations center.

How Bell System communications serve the power industry

Modern communications help Northern States make profitable use of a million-KW capacity

Bell System private line channels tie the power networks serving homes and industries in 527 upper Midwest communities to the new system operations center of Northern States Power Company in Minneapolis.

The slightest fluctuation in output, increase in load, or the first signs of bad weather are transmitted directly to the center, giving NSP dispatchers plenty of time to adjust spinning reserve capacity.

Bell System channels for telemetering, and supervisory control (which permits remote control of generation from the center), form the nerve system that lets NSP give efficient, economical power and light to 2,000,000 people.

Your Bell Telephone representative is your best source of ideas on how to streamline your own communications. He will be glad to study your needs. Call him at your local Bell Telephone business office.

BELL TELEPHONE SYSTEM

PRIVATE LINE TELEPHONE • PRIVATE LINE TELETYPEWRITER
CHANNELS FOR: DATA TRANSMISSION • TELEMETERING
REMOTE CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV

er, Oklahoma Gas and Electric Co., Oklahoma City.

Kate A. Niblack of Oklahoma City was reappointed Association secretary.

Capacitor industry progresses during '56

INSTALLED CAPACITOR kilovars in the United States increased from 34,500,000 to 40,500,000 during 1956, according to W. G. Hart, manager of power capacitor sales for General Electric's Capacitor Department, Hudson Falls, N. Y. The ratio of installed capacitor kvar to peak load kilowatts was .35 at the end of 1956.

Mr. Hart commented on the continuing trend on the part of many utilities to push their system power factors toward unity. "Many utilities," he said, "are finding it economical to operate their systems at power factors 98 per cent and higher at the time of their system peaks. Peak efficiency, optimum use of facilities and reduction of power production costs have been the chief benefits of this trend."

Mr. Hart names significant accomplishments by the capacitor industry during 1956 as the acceptance by utilities of a more economical 50-kvar capacitor, now an industry standard, and the development of a protective gap for series capacitors used with distribution transformers which brings about greatly increased applications of series capacitors.

New training twist for Chapman salesmen

A COMMON success axiom in selling is a thorough acquaintance with the product or service to be sold, together with an understanding of the company from which that product or service emanates.

For salesmen of such organizations as Cary Chapman and Company of Atlanta, Ga., this goal becomes difficult, representing, as they do, a number of electrical supplies and equipment manufacturers.

With a Company sales meeting in order recently, Mr. Chapman uniquely solved the problem by taking his sales force to the meeting, rather than bringing it to the sales men. In short, he personally conducted his eleven representatives through each of the factories represented in the South by the Chapman Company. Management of each factory in turn put on its own sales meeting, specifically geared to its needs, and acquainted each Chapman representative with its full manufacturing facilities.

Cary Chapman and his sales force which recently paid visits on Northern manufacturing companies. Left to right, seated, Robert W. Chapman, Eric K. Wadsworth, R. R. Redmond, Charles R. Taylor, Gilbert W. Allen, F. A. Zeller; standing, R. B. Baldwin, D. C. Scivley, Jr., W. H. Maxwell, Jr., D. W. Oldham, Mr. Chapman, and Robert E. Barnes.

The group's itinerary included visits at the Plymouth Rubber Co., Canton, Mass.; Collyer Insulated Wire Company and Royal Electric Corp., both of Pawtucket, R. I.; Pyramid Instrument Co., Remcon Division, Lynbrook, L. I., N. Y., and CBS Hytron Tube Co., Danvers, Mass.

Salesmen accompanying Mr. Chapman included Robert W. Chapman, R. R. Redmond, and W. H. Maxwell, Jr., all of Atlanta, Ga.; Eric K. Wadsworth and R. B. Baldwin, both of Miami, Fla.; Charles R. Taylor and D. W. Oldham, both of Greensboro, N. C.; F. A. Zeller and D. C. Scivley, Jr., both of New Orleans, La.; Gilbert W. Allen, Birmingham, Ala.; and Robert E. Barnes, Tampa, Fla.

Operations control key to distributors' success

THE NEED FOR an adequate return on invested capital has become the paramount problem for electrical distributors, according to Arthur W. Hooper, executive director of the National Association of Electrical Distributors.

Wholesale distributors of electrical construction materials will record the greatest sales year in history with estimated 1956 sales of $3,781,000,000. Total sales of the electrical wholesaling industry including specialty appliance, television and electronic distributors may reach $7,806,000,000 for the year 1956.

Despite the record volume, Mr. Hooper said, the electrical wholesale distributing business has become extremely sensitive and success is being achieved only by those firms that have close control over their operations.

By reducing expenses, such firms have been able to weather continuing declines in the gross margin, ranging from 1 to 1½ per cent.

As a result, some firms have been able to take advantage of a 16 per cent sales volume increase in first ten months of 1956 to accomplish a slight increase in net income (before Federal taxes). However, the results (after Federal taxes) constituted a very inadequate net return on sales and investment in this commercial risk type of business, Mr. Hooper reported.

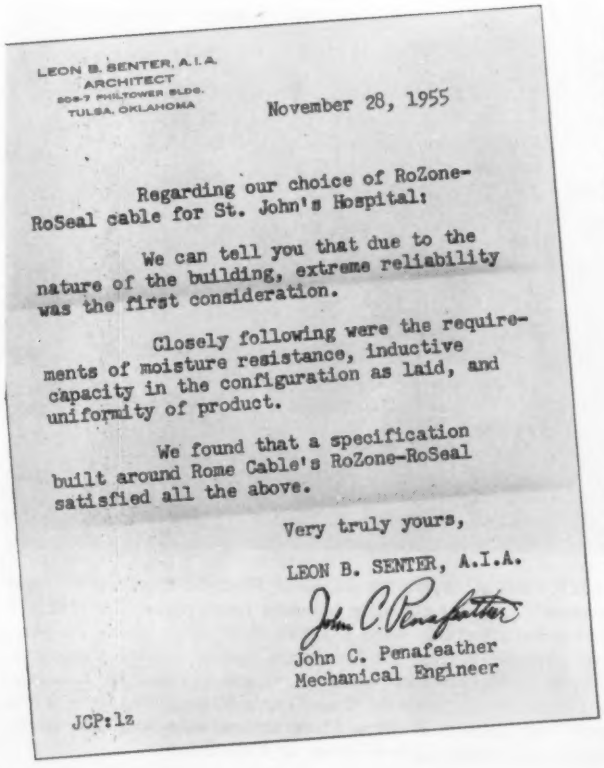
The electrical wholesaling business (apparatus and supplies, including combination supplies-housewares) as represented by the figures above is so sensitive to capital investment in new plants and equipment modernization, adequate wiring, better lighting and consumer willingness to spend for new and improved electrical appliances, that wholesale firms are watching for visible or probable trends reflecting unfavorable attitudes.

He added that the pressures of operating a business within such tight economic limits has made it necessary for many wholesalers to

CAN BE INSTALLED ANYWHERE. Here workers begin to feed RoZone-RoSeal cable into conduit inside underground vault of St. John's Hospital. This versatile cable can be used anywhere—in the air, in conduit and ducts, direct in earth, even in water.

EASY TO PULL. Workers at the new St. John's Hospital in Tulsa draw Rome's easy-pulling high-voltage cable from underground switch vault to surface and power transformers. The hospital's architect recognized *all* the advantages of RoZone-RoSeal (see his letter below).

Profit from this architect's experience with Rome's premium high-voltage cable



LEON B. SENTER, A.I.A.
ARCHITECT
508-7 PHILTOWER BLDG.
TULSA, OKLAHOMA

November 28, 1955

Regarding our choice of RoZone-RoSeal cable for St. John's Hospital:

We can tell you that due to the nature of the building, extreme reliability was the first consideration.

Closely following were the requirements of moisture resistance, inductive capacity in the configuration as laid, and uniformity of product.

We found that a specification built around Rome Cable's RoZone-RoSeal satisfied all the above.

Very truly yours,

LEON B. SENTER, A.I.A.

John C. Penafeather

John C. Penafeather
Mechanical Engineer

JCP:lz

He wanted the same things you probably want in a high-voltage cable: reliability, moisture resistance, the right electrical characteristics, and uniformity. He found them all in Rome Cable's RoZone-RoSeal.

You can use this cable anywhere—in the air, in conduit and ducts, buried in earth, *even in water*. Here's how it compares with most conventional thermosetting nonmetallic cables:

- Costs less.
- Greater resistance to moisture and comparable resistance to abrasion, crushing, impact, chemicals, and oils.
- Easier pulling and bending. The RoSeal (polyethylene) jacket has a lower coefficient of friction than any other jacket material. And it bends easily at temperatures as low as −40° C.
- High corona levels on power cables.

Rome Cable's RoZone-RoSeal met this architect's rigid specifications, and it can meet yours, too.

Specify RoZone-RoSeal for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 702 and ask for Bulletin ROT-1. Rome Cable Corporation, Rome, New York.

ROME CABLE
CORPORATION

CITY WITH HOLIDAY SPARKLE—A study in modern illumination is Oklahoma City's night skyline, from the midst of which shimmers the First National Bank Bldg. This photo shows what happened during the past Christmas season when downtown stores and office buildings kept lights on until 10 p.m. to enliven spirits of holiday shoppers.

adopt new concepts and new plans for their businesses.

The year 1957, Mr. Hooper said, will find distributors continuing to drop unprofitable lines. Heavier concentrations and support of those lines backed up by a distributor policy is expected next year as wholesalers come to realize the high cost of "playing the field" and backing away from the basic functions needed to justify a place in the trade channel.

A-C names distributor, certified service shop

SHEALY Electrical Wholesalers, Inc., 3720 North Main St., Columbia, has been named a distributor for Allis-Chalmers transformers in 12 central and northeastern counties in South Carolina.

Area served includes Richland, Fairfield, Kershaw, Lexington, Calhoun, Sumter, Lee, Darlington, Florence, Marion, Dillon and Horry counties.

Shealy Electrical Wholesalers was established in August, 1956. Principals in the firm include John W. Shealy, president; J. H. Viser, vice-president and treasurer, and Willard W. Wise, sales manager.

Announcement is also made of the appointment of the Service & Supply Co., 1301 West 6th St., Amarillo, Texas, as a certified service shop for Allis-Chalmers transformers in the territory comprising the company's Amarillo district. H. F. Champion is manager of the Service & Supply Co., which was founded in 1936.

Atlanta sales agents given Chromalox line

APPLEBEE-CHURCH, INC., with offices at 1389 Peachtree St., N. E., Atlanta, Ga., have been appointed sales agents in the Southeastern area for Chromalox electric heating equipment.

Charles F. Applebee was for eight years associated with C. B. Rogers and Associates of Atlanta, former Chromalox sales-engineering representatives. Walter B. Church began his career with the Company in Pittsburgh in 1946, later serving with the Paul V. Renoff Company, Baltimore Chromalox representative.

Jacksonville FAEC's elect '57 officers

JACKSONVILLE Chapter, Florida Association of Electrical Contractors recently announced election of its 1957 officers, headed-up by James Dandelake, president.

In addition to Mr. Dandelake, the Jacksonville FAEC's unanimously chose Martinez Baker, vice-president; Jude M. Joseph, treasurer; and Thomas L. Wrenn, FAEC director.

HAPPY MOMENT FOR A WINNER—Edison Electric Institute's "How is Your Housepower?" contest recently brought forth more than 316,000 entries in a five-month period, with $10,000 first prize going to Mrs. Mary P. Brown, secretary to a Philadelphia public school principal. Awarding the check to Mrs. Brown, above, are, left to right, M. I. Allen, vice-president, Philadelphia Electric Co.; Frank Kitzmiller, New York Housepower program manager, Edison Electric Institute; and George E. Whitwell, president, Electrical Association of Philadelphia.

Kaiser buys wire interest of U. S. Rubber Company

THE WIRE and cable business of United States Rubber Compan has been sold to Kaiser Aluminum & Chemical Corp. The sale, which became effective February 1, included the plant, property and equipment in Bristol, R. I. In addition, Kaiser Aluminum takes over U. S. Rubber's wire and cable inventories, sales organization and distribution network.

"The 1,400 employes of our wire and cable department will be transferred to the Kaiser Aluminum organization," said Mr. Humphreys. "They will maintain the same or equivalent employe benefits—such as pensions, vacations and various insurance benefits."

Mr. Humphreys said U. S. Rubber has been considering getting out of the wire business for some time, since it is more closely allied to the metals field than to the rubber industry. He added that the company expects to continue to supply the rubber used for wire insulation at the Bristol plant.

U. S. Rubber has produced insulated wire and cable at the Bristol plant since 1892.

EEI announces lighting demonstration catalogue

TO HELP the electric utilities meet their needs for aggressively selling the commercial lighting market, the Commercial Lighting Committee of Edison Electric Institute has prepared a comprehensive and thorough "Catalogue of Lighting Demonstration and Exhibit Materials."

The catalogue is full of illustrations and information of useful selling tools proven needed by the lighting salesman in the field. Selected props and other materials available in the industry for use in group lighting demonstrations and exhibits are shown, each with an illustration and text, giving a description of the kit and its method of application.

The majority of the equipment listed may be purchased outright or rented from the manufacturer. In some instances, utilities have designed and constructed their own demonstration units. Thus the illustrations and accompanying dimensional details will serve to aid those who contemplate building similar pieces.

The material listed can be used either for individual or group audiences. Price of the catalogue is $1.00 to EEI member companies and $1.50 to non-member companies and companies out of the U. S. A.

PFMA CERTIFIED RATINGS

Peerless-Electric®

Centrifugal Roof Ventilator

DEVELOPED AND MANUFACTURED WITH APPLIED CENTRIFUGAL BLOWER PRINCIPLES

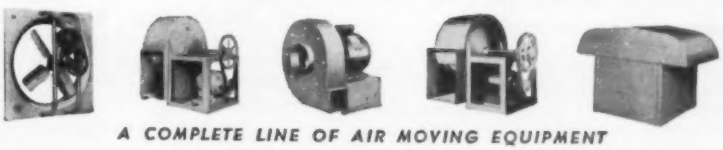
QUIET! . . . Matching wheel cone accurately fits venturi inlet to create quieter, smoother air movement. Ideal for hospitals, churches, auditoriums and schools.

STURDY! . . . All welded construction. Material 16 ga. or over. Built for life of building.

PERFORMANCE! . . . Each unit air-tested, and rated to assure certified ratings. Exceedingly high efficiencies. Detailed performance data in Bulletin SDA-220.

ADAPTABILITY! . . . Fits standard curb sizes. Lower h.p. ratings for quieter operation. Higher h.p. for commercial and industrial applications.

Write Today for Bulletin SDA-220



A COMPLETE LINE OF AIR MOVING EQUIPMENT

Charter Member of the Air Moving and Conditioning Association, Inc.

FAN AND BLOWER DIVISION

Peerless-Electric

THE Peerless-Electric® COMPANY

1452 W. MARKET ST. • WARREN, OHIO

FANS • BLOWERS • ELECTRIC MOTORS • ELECTRONIC EQUIPMENT

New booklet features heat pump installations

FIFTY-SIX Data Sheets on residential and commercial heat pump installations, containing design and operating data, have been compiled in booklet form by the Edison Electric Institute.

Produced by the Electric Space Heating and Air Conditioning Committee, they answer questions which might exist in the minds of those who are occupied with heat pump application. This includes: ratios of calculated heat loss to heat gain; kilowatthours per winter degree day per thousand Btu calculated heat loss; kilowatthours per winter degree day per thousand cubic feet of conditioned volume; kilowatthours per summer degree or degree hour per thousand Btu calculated heat gain; and kilowatthours per summer degree day or degree hour per thousand cubic feet of conditioned volume.

Also included are winter and summer load factors where ratios of supplementary resistance heating with air source heat pumps to balance points on residential and on different types of commercial installations, and a useful definition of summer degree day or summer degree hours.

There are illustrations for 45 of the Data Sheets depicting homes and commercial establishments which have installed the heat pump.

The Data Sheets have been grouped by climatic zones so they might serve for comparing seasonal consumption, load factors, etc., as compared with estimated or predicted seasonal consumption and demands for heat pump installations under similar climatic conditions.

Price for the booklet is $2.00 to EEI member companies, and $3.00 to non-member companies and companies outside the U. S. A. Order from Commercial Department, Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

Keystone appoints new representatives

KEYSTONE has added to its nationwide representation with the appointment of seven new manufacturers representatives, according to an announcement by Chester E. Cook, general sales manager of Keystone Manufacturing Co.

The seven, active in the electrical equipment industry for many years are: Mid-South Associates, Little Rock, Ark., Electric Sales Co., Los Angeles, Calif., W. T. Evans, Ft. Lauderdale, Fla.; Robert P. Auer, Baltimore, Md., Wood and Anderson, Mission, Kan.; A. J. Nelson Co., Denver, Colo., and Albuquerque, N. M.; Paul Mayo, Jr., Richmond, Va.

In servicing the wholesale houses in their respective territories, all of the new representatives will handle the complete Keystone line.

Brief news notes of manufacturers

PURCHASE of the stock of the Holdenline Company has been announced by the John C. Virden Co., Cleveland, Ohio. Holdenline, founded in 1939, will become a subsidiary of Virden.

"The acquisition of the Holdenline Company is part of our expansion plan to meet increased demands for lighting fixtures," President John C. Virden said. "It complements our present line of residential and commercial fixtures and will add excellent sales potential for our distributors and ourselves. Production of the Holdenline products will be partially integrated in our Cleveland Juniata Ave. plants to enable us to centralize our design and engineering activities."

Harry Schockett of the Virden Company will be responsible for the design and engineering of the new subsidiary and Anthony Milicia will become plant superintendent.

* * *

C. T. ELECTRICAL Controls Ltd., Brandon, Man., has announced expansion of its American operations with the opening of a field office in St. Petersburg, Fla.

The St. Petersburg office is located in the Florida National Bank Building, staffed by Marvin Black and Bill Terrell, both active in the Southern electrical industry. C. T. Electrical Controls is a division of Pioneer Electric Ltd., Winnipeg, manufacturers of transformers and other equipment.

Dates Ahead

The Electrical Trade Conference and Exposition, Shoreham Hotel, Washington, D. C., Feb. 12-14, 1957.

National Adequate Wiring Bureau, 13th Annual Conference, Sherman Hotel, Chicago, Ill., February 21-22, 1957.

Southern Safety Conference and Exposition, John Marshall Hotel, Richmond, Va., March 3-5, 1957.

Mississippi Chapter, IAEI, Annual Meeting, Heidelberg Hotel, Jackson, Miss., March 4-5, 1957.

Mid-South Metermen's Assn., Annual Meter School, Univ. of Tenn., Knoxville, Tenn., March 25-29, 1957.

Oklahoma Utilities Association, Annual Convention, Tulsa Hotel, Tulsa, Okla., March 28-29, 1957.

Southeastern Electric Exchange, 24th Annual Conference, Boca Raton Hotel & Club, Boca Raton, Fla., April 1-3, 1957.

Edison Electric Institute, 23rd Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill., April 1-4, 1957.

Virginia Chapter, IAEI, Annual Meeting, Nansemond Hotel, Norfolk, Va., April 8-9, 1957.

Tennessee Chapter IAEI, Annual Meeting, Jackson Hotel, Nashville, Tenn., April 15-16, 1957.

Protective Relay Engineers, Tenth Annual Conference, A & M College of Texas, College Station, Texas, April 15-17, 1957.

South Carolina Chapter, IAEI, Annual Meeting, Columbia Hotel, Columbia, S. C., April 18-19, 1957.

Florida Chapter, IAEI, Annual Meeting, Washington Hotel, Jacksonville, Fla., May 3-4, 1957.

Baton Rouge, George Welman, North Louisiana - East Texas, Texas, and Texas Gulf Coast Chapters, IAEI, Joint Meeting, Heidelberg Hotel, Baton Rouge, La., May 10-11, 1957.

Ellis Cannady Chapter, IAEI, Annual Meeting, Carolina Hotel, Raleigh, N. C., May 14-15, 1957.

Southern Section, IAEI, Annual Meeting, Dinkler Plaza Hotel, Atlanta, Ga., Oct. 14-16, 1957.

Florida Assn. of Electrical Contractors, Annual Convention and Trade Show, Soreno Hotel, St. Petersburg, Fla., Oct. 16-19, 1957.

Jacksonville, Fla.

Birmingham, Ala.

Bristol, Tenn.

Richmond, Va.

THE "GENERAL" ADDS TEN NEW STARS

Atlanta, Georgia
Baltimore, Maryland
Boston, Massachusetts
Chicago, Illinois
Cincinnati, Ohio
Cleveland, Ohio
Dallas, Texas
Dayton, Ohio
Denver, Colorado
Detroit, Michigan
Greensboro, North Carolina
Indianapolis, Indiana
Kansas City, Missouri
Lincoln, Nebraska
Los Angeles, California

Memphis, Tennessee
Milwaukee, Wisconsin
Minneapolis, Minnesota
Newark, New Jersey
New Haven, Connecticut
New Orleans, Louisiana
Philadelphia, Pennsylvania
Pittsburgh, Pennsylvania
Portland, Oregon
St. Louis, Missouri
San Francisco, California
Seattle, Washington
Springfield, Illinois
Syracuse, New York
Tampa, Florida

Backing up our Authorized Distributors' stocks, General Cable now adds 10 New Distributing Centers to its nationwide operation. Now, to keep pace with soaring demands, there will be 40 General Cable Distributing Centers fully stocked to meet our Authorized Distributors' wire and cable requirements.

Rely on General Cable's Authorized Distributor stocks for superior quality, unequalled service and availability for all your wire and cable needs.

GENERAL CABLE CORPORATION
420 Lexington Avenue, New York 17, New York
Offices and Distribution Centers Coast-to-Coast.

for quality and service... **specify GENERAL CABLE**

News about people

William S. Ginn has been elected vice-president of the **General Electric Co.**, it has been announced by company president Ralph J. Cordiner.

Mr. Ginn is general manager of General Electric's Transformer Division with headquarters at Pittsfield, Mass., and is among the youngest ever elected to a General Electric vice-presidency.

A native of Atlanta, Ga., Mr. Ginn joined General Electric in 1936 after

William S. Ginn

graduation from Georgia Institute of Technology. He was first assigned to the engineering training program in Pittsfield and Schenectady. Mr. Ginn was appointed assistant manager of the Power Transformer Sales Division, and became division manager shortly thereafter. He was appointed assistant manager of sales for the Transformer and Allied Product Divisions in 1949, and manager of sales in 1950. In 1952, Mr. Ginn served as general manager of the Power Transformer Department, and as general manager of the Transformer Division at Pittsfield since 1954.

L. O. (Sheriff) Ledford, vice-president of **Ceil Heat, Inc.,** of Knoxville, Tenn., announces the appointment of **Robert G. Ely, Jr.** as general sales manager, effective February 15, 1957. He will move with his family to Knoxville and have offices in the Ceil Heat plant at 5212 Homberg Drive.

Mr. Ely is a graduate of the University of Tennessee, majoring in electrical engineering, and while attending the University was a classmate of **James E. Goff** who has gained national recognition as a designer of electric heating products as vice-president in charge of research and development with Ceil Heat.

Mr. Ely cut his eye-teeth pulling

Robert G. Ely, Jr.

wire, as his father is an electrical contractor and owner of the Ely Electric Co., in Benton, Ky. After graduating from the University of Tennessee, he joined the Engineering Department of the Knoxville Utilities Board, designing power distribution lines, after which he became associated with an electrical wholesale jobber, Roden Electrical Supply, of Knoxville. Later he was with the Moore Handley Supply Company, in Nashville, as city salesman.

For the past four years, Mr. Ely has been manager of the Electrical Department of the Hajoca Corporation, in Chattanooga, Tenn. He is vice-president of the Electric League of Chattanooga, and Chairman of the Committee on Electric Heating for the National Association of Electrical Distributors.

Mr. Ely's wide knowledge and enthusiasm in the field of electric heat well qualifies him to assume his new duties as general sales manager of Ceil Heat, says Mr. Ledford.

The appointment of **Marshall N. Waterman** to commercial engineering manager of the large lamp department of the **Westinghouse Lamp Division** was announced recently by Robert D. Barr, general sales manager of the large lamp department.

Active in the lighting industry for more than 25 years, Mr. Waterman joined Westinghouse in 1948 as manager of illuminating engineering for the Lamp Division. Later he became assistant commercial engineering manager. Prior to his employment with Westinghouse he was a member of the executive staff of the Electrical Testing Laboratories, Inc.

A graduate of Massachusetts Institute of Technology (1924), his first professional post was with the street lighting department of General Electric Company. After a year he joined the Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., remaining 15 years, first as a member of its lighting sales and application group and then as director of the unit.

Charles L. Woodyard and Associates of Atlanta has announced appointment of **William I. Vawter, Jr.,** as sales representative for the Georgia-Alabama territory.

A native Oregonian, Mr. Vawter attended California schools, including San Mateo Junior College and the University of California at Los Angeles. After three years of Army Signal Corps service during World War II, he joined Graybar Electric Company in Los Angeles, transferred by that company to Atlanta in 1953, where he has served as supply salesman until his recent appointment with the Woodyard organization.

John Chickering, formerly applications engineer for the New York City Industrial Division, has been appointed branch manager for **Federal Pacific Electric Company** sales in the Washington, D. C. area, according to an announcement by H. E. Knudson, Middle Atlantic sales manager.

"Mr. Chickering's primary function," Mr. Knudson said, "will be

John Chickering

to streamline, strengthen and coordinate Federal Pacific's service for government purchasing and procurement accounts."

Mr. Chickering began his business career as a design engineer for the Berko Electric Manufacturing Co. In 1952 he joined the staff of Federal Pacific in Long Island City, N. Y. as a field engineer.

Tom Price, of Houston, and his associate, **G. P. Coffee,** of Corpus Christi, Texas, have been appointed factory district representatives for South Texas by **Typhoon Heat Pump Co.,** of Tampa, Fla.

O. J. Miller and **W. B. McGuire** have been appointed executive vice-president and assistant to the president, respectively, by the **Duke Power Co.,** it was announced recently.

Mr. Miller has been vice-president and general manager of the company since 1948 and a director since 1946. Mr. McGuire was formerly in the Legal Department as assistant general counsel and has been a director since 1954.

As executive vice-president, Mr. Miller will be in charge of all operations. He is an electrical engineer of wide experience and has been in the utilities business since 1916. He was manager of production and transmission for the Tennessee Electric and Power Company and subsequently with the Commonwealth and Southern Company at Jackson, Mich., prior to his association with Duke Power in 1943.

Mr. McGuire is a graduate of Davidson College and of the Duke University Law School.

Six promotions in branch operation management of **Duke Power Company** have been recently announced by **Thomas F. Hill,** vice-president and supervisor of branches.

C. B. Miller, Jr., assistant supervisor of branches, is now assistant to the vice-president, while **D. W. Jones,** Winston-Salem district manager since 1954, is assistant supervisor of branches in the General Office. **Joseph C. Mason,** Winston-Salem electrical superintendent, succeeds Mr. Jones.

J. D. Sloan, Hendersonville manager, is new assistant manager of the Charlotte District; **J. M. Gaines,** Brevard manager, succeeds Mr. Sloan, and **F. L. Yarbrough,** Greensboro Engineering Dept., takes over as Brevard manager.

Recently elected Fellows in the **American Institute of Electrical Engineers** are **Edward R. Coulbourn** and **Edgar W. Robinson,** engineering manager and consultant, respectively, Alabama Power Co., Birmingham, Ala., and **Burns N. Gafford,** professor and chairman, Electrical Engineering Department, University of Texas, Austin, Texas.

Mr. Coulbourn received his AIEE citation "for his achievements in the design of an extensive electric production, transmission, and distribution system."

"For his engineering and administrative achievements in the design and operation of a large steam and hydroelectric power utility," Mr. Robinson was honored by the Institute.

The AIEE cited Mr. Gafford "for his contributions as a teacher and administrator in a university and for his promotion of a better understanding of utility power problems."

"Triple-A" Approval

IDEAL

Wire-Nuts®

Patented 1,933,555

THE SOLDERLESS, TAPELESS WIRE CONNECTORS

are approved for 600-V. use

As pressure cable connectors for branch circuit wiring, appliance and machine hook-ups, fixture hanging, etc. (Contractor sizes 74-B and 76-B comply with Sec. 1115, N.E.C.)

approved

and used by more contractors than any other mechanical connector for easier, low-cost, lifetime-safe pig tail splices.

approved

by owners, architects and engineers as evidence of quality in wiring jobs.

moral: IT JUST MAKES GOOD DOLLARS AND SENSE TO USE IDEAL "WIRE-NUTS" ON ALL YOUR WIRING JOBS.

Only IDEAL makes "Wire-Nuts". Look for the name — symbol of quality and performance for over 30 years.

SOLD THROUGH AMERICA'S LEADING DISTRIBUTORS

IDEAL

IDEAL INDUSTRIES, INC.
1017-B Park Avenue, Sycamore, Illinois
Please send catalog on Ideal "Wire-Nuts" Connectors.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Canadian Distributor: IRVING SMITH, LTD., Montreal

YOU can count on ARROW•HART for ON-THE-JOB HELP

Arrow-Hart Type RACB Combination Starters At The Connecticut By-Products Company, Columbia, Connecticut

Type RACB

PROBLEM: To provide the best method of one-point control for electrically operated production equipment in a new plant . . . and to answer perplexing installation wiring questions.

The Arrow-Hart Distributor, Beacon Light & Supply Company, Hartford, Conn., called for ARROW-HART SALES ENGINEERING SERVICE. THE NEAREST ARROW-HART SALES ENGINEER PROMPTLY WENT DIRECT TO THE JOB.

SOLUTION: The A-H Sales Engineer analyzed the requirements and recommended Arrow-Hart Type RACB Combination Starters to save space and assure easy, fast installation and economical operation. Type TRA Reduced Voltage Starters were used to protect against line disturbances.

Equally effective on-the-job assistance is offered to all Arrow-Hart Distributors, Electrical Contractors and Plant Engineers confronted with perplexing problems. Simply write Dept. WLM, The Arrow-Hart & Hegeman Electric Company, 103 Hawthorn Street, Hartford 6, Connecticut, for complete information on ARROW-HART SALES ENGINEERING SERVICE.

ARROW AH HART

Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

ARROW AH HART

A number of executive changes in the **Virginia Electric and Power Company** have been announced by vice-president Miles Cary.

James A. Rawls, system manager of transmission and distribution, was appointed manager of engineering and construction. Mr. Rawls will assume the responsibilities and duties of **E. S. Fitz,** who resigned as vice-president of engineering and construction.

George M. Tatum, chief engineer, has been appointed manager of planning and research. Mr. Tatum will direct the planning of facilities to provide for the rapid growth in electric loads on the company's system. He will also direct research and studies of the various special problems that continuously arise in connection with engineering and operation, including those on the generation of electric power from nuclear fuel.

Robert L. Ware, system superintendent of distribution, will succeed Mr. Rawls as system manager of transmission and distribution.

L. L. Eley, Jr., now district superintendent at Charlottesville, will fill the post vacated by Ware's appointment.

Charles S. Betts, Jr., Richmond district superintendent, was appointed Potomac district manager to succeed **R. C. Hopkins,** who was elected vice-president of Vepco's Western division.

Marion L. Simpson, superintendent of lines in Alexandria, was appointed district superintendent in Richmond to succeed Mr. Betts. Mr. Simpson will be in charge of operation and maintenance of the company's distribution system and service operations in the Richmond area.

Harrison Hubard, assistant chief system operator, was named chief system operator, to succeed **Charles Stebbins** who retired in December. Mr. Hubard will direct the switching and dispatching of power over the company's transmission system, including interconnections with neighboring utility companies, and the assignment of loads to the various power generating stations for maximum efficiency.

R. E. Doyle, Jr., vice-president and general manager of the **Kentucky Power Co.,** has been named to the position of assistant general manager of the Indiana and Michigan Electric Company at Fort Wayne, Ind. Both companies are operating subsidiaries of the American Gas and Electric Co.

In announcing Mr. Doyle's appointment, Philip Sporn, president of AGE, said that **F. M. Baker,** assistant general manager, would succeed Mr. Doyle as general manager of the Kentucky company.

A 25-year veteran in the electric utility field, Mr. Doyle was employed by Kentucky Power Company

at Pikeville in 1930 as a construction engineer. He was later named district engineer and in 1941 was promoted to manager of the Pikeville district.

He was transferred to the company's general offices in Ashland as assistant general manager in 1947 and rose to general manager in 1948. He was elected to the company's board of directors and was named vice-president of the Kentucky company in 1952.

Pittsburgh Reflector Company announces the appointment of **Frank E. Rickel** as sales manager of the firm. He will make his headquarters at the company's executive offices in Pittsburgh.

Prior to his present appointment, Mr. Rickel was the advertising and

Frank E. Rickel

sales promotion manager of the company, a position he has held since he first became associated with the company in 1952. In his present capacity he will head liaison between the company's 34 sales offices and its over 1,000 distributors.

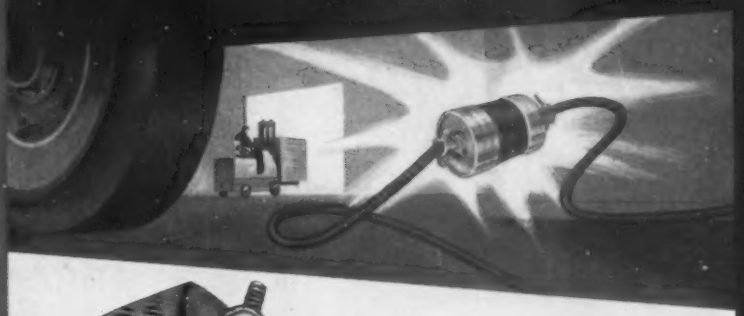
C. J. Ellis, manager of the Tampa office of the **General Electric Company's** Apparatus Sales Division for the past nine years, has been appointed manager of G-E User Industry Sales for the state of Florida. The appointment was announced by R. H. Jackson, Southeastern district manager, Atlanta.

Mr. Ellis succeeds **F. H. Worthington,** Jacksonville, who will remain as a consultant until his retirement next year. With Mr. Ellis' appointment, the state sales headquarters will be transferred from Jacksonville to Tampa.

Mr. Ellis, a native of Louisiana, was graduated from the U. S. Naval Academy in 1936 and joined General Electric the same year. He served in G-E's Federal and Marine Department in Schnectady and in the Chattanooga, Tenn., office as sales engineer. He became Tampa office manager of the Apparatus Sales Division in 1947.

ARROW AH HART

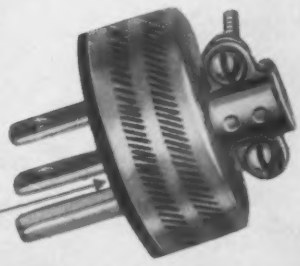
TOUGH ENOUGH
TO TAKE THIS...
and SAFE!



No. 5286
15 Ampere, 125 Volt

ARMOR FOR TOUGHNESS

RUBBER RIM FOR SAFETY



No. 5686 15 Ampere, 250 Volt

ARROW-HART
Armor-Over-Rubber
GROUNDING CAPS

TOUGH . . . Arrow-Hart 3-wire, 2-wire Armor-Over-Rubber Grounding Caps have been torture-tested . . . run over by a truck and thrown against a wall without damage. And *there's no bakelite to crack and short circuit!*

SAFE . . . Only Arrow-Hart Grounding Caps have the Rubber Rim that means greater insulation . . . protection . . . safety!

Write for complete information to The Arrow-Hart & Hegeman Electric Company, 103 Hawthorn Street, Hartford 6, Conn. Offices and sales engineers in principal cities.

ARROW AH HART

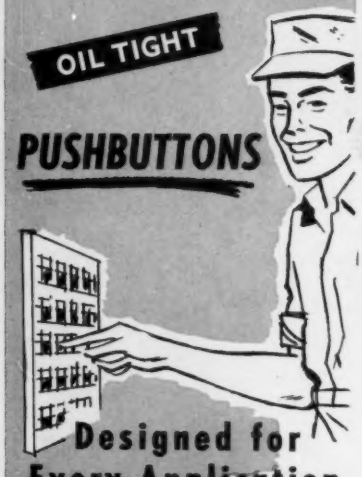
Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

NEW FURNAS ELECTRIC

OIL TIGHT

PUSHBUTTONS

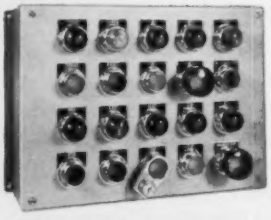


Designed for Every Application

Now for the first time, because of standardization and interchangeability, more combinations of Oil Tight push buttons are available with fewer parts. As a result, Furnas Electric design and research again lead the field, this time with the finest oil tight push buttons available.

When you specify Furnas Electric, you get one standard contact block. No rights or lefts—no special units for horizontal or vertical mounting.

Accessories (key lock, mushroom head or lever) are mounted directly on all standard operators. Operators need not be modified or removed from panels.



For full information write for Catalog 5606, Furnas Electric Company, 1064 McKee Street, Batavia, Illinois.

FURNAS 25th YEAR

A17

FURNAS ELECTRIC COMPANY

BATAVIA, ILLINOIS

Sales Representatives in All Principal Cities

R. R. Rector **James Johnson** **W. G. Roberson** **M. O. Rowe**

(Editor's Note: A photo in the December issue designated as that of Walter G. Roberson, of Holan Corp. of Ga., was actually the photo of James Johnson of the same company. Electrical South regrets this error and republishes the complete announcement for clarification.)

Three new men, including a vice-president in charge of sales, have been appointed to **Holan Corporation of Georgia, Griffin, Ga.** The announcement was made by **J. Howard Holan,** president, and **V. H. Warner,** vice-president and national director of sales for **J. H. Holan Corporation,** Cleveland.

Robert R. Rector is the new sales vice-president at Griffin. He comes to Holan from McCabe-Powers Auto Body Company where he was a southern sales representative for six years. Prior to that, Rector was affiliated with American Coach & Body in Cleveland. A former R. C. A. F. and Air Force Captain, he attended Findlay College and Ohio State University.

Two new salesmen are **Walter G. Roberson** and **James Johnson.** Mr. Roberson, who formerly worked for Murphy Body Works, Wilson, N. C., was in the army transportation corps for nearly three years. He attended Wake Forest College and Atlantic Christian College. Mr. Roberson is serving Holan customers in Georgia, Tennessee and Arkansas.

Mr. Johnson, a former Florida resident, has been a McCabe-Powers field representative in Northern Illinois and Wisconsin for two years. He attended Northwestern University. His sales area will include Florida, Alabama and Mississippi.

Continuing as a fourth salesman in the Holan southern operation is **M. O. "Bud" Rowe,** who resides in Dallas, Texas, and handles Texas, Louisiana and Oklahoma.

The board of directors of **Virginia Electric and Power Company** has elected **Ray C. Hopkins,** Potomac district manager, to the vice-presidency of Vepco's Western division, and accepted retirement resignations of **James M. Wilson,** Western division vice-president, and **E. S. Fitz,** vice-president of engineering and construction.

Mr. Wilson's association with Vepco began with his appointment as superintendent at Ronceverte, W. Va., in 1914. He served at Hinton, W. Va., and Clifton Forge in various management posts before becoming Western division vice-president in 1946.

Mr. Fitz joined Vepco in 1928 after broad management experience with other utility companies. Ten years later he was named general manager of the Vepco Electrical Department. Mr. Fitz was given the added responsibility of gas operations at Norfolk and Newport News in 1947 and later that year was elected a vice-president.

Two new appointments have been announced at **Oklahoma Gas and Electric Company** upon the retirement of **James B. Redwine,** Seminole district manager.

James D. Maguire, formerly manager of the company's Holdenville district, has become manager of the Seminole district. He was replaced at Holdenville by **Cecil A. Sanders,** who was assistant auditor for the Eastern division. Both men are members of the company's Trailblazer Club, which is limited to members with 25 or more years company service.

Mr. Redwine has been a member of OG&E since November, 1923, having started as storekeeper in the Gas department at Norman. OG&E later sold its gas properties.

Ideal Industries, Inc., of Sycamore, Ill., has announced the addition of **Jack Strack** and **Wiley Virden** in its Atlanta office.

Mr. Strack, a graduate of Fordham University and formerly with American-Standard Corp., will represent the company in Tennessee, North Georgia, and North Alabama.

Mr. Virden, formerly with Ernest T. Loyd, Inc., will represent Ideal-Simplet Fittings Division thtroughout the Atlanta office territory.

Appointment of **Robert W. Minett Jr.** as director of advertising and merchandising was announced today by John C. Virden Jr., president of the **John C. Virden Co.**, Cleveland.

Mr. Minett was formerly vice-president of Thomas Industries Inc., Louisville. He is also president of the American Home Lighting Institute, trade association of residential fixture manufacturers, and has been in the lighting industry since 1938.

"Minett's appointment to our executive staff is part of the further expansion of our company's activities in the residential and commercial lighting fields," Mr. Virden said.

Three promotions of branch office managerial personnel have been announced by Thomas F. Hill of Charlotte, **Duke Power Company** vice-president and supervisor of branches.

J. D. Sloan, manager of Duke's Hendersonville branch, becomes assistant manager of the company's Charlotte office; **J. M. Gaines,** manager in Brevard, succeeds Mr. Sloan in Hendersonville; and **F. L. Yarbrough** of Duke's Greensboro office will take over as manager in Brevard.

In coming to Charlotte, Mr. Sloan becomes assistant manager of the company's largest branch. The newly-enlarged Hendersonville District is a key office on the western end of the Duke system and exercises supervision over the company's operations in Brevard and in a number of smaller communities.

Mr. Sloan joined Duke Power in 1930 after his graduation from Clemson College and a year in Schenectady, N. Y. with General Electric Co. In 1940 he was promoted from engineer in the Spartanburg office to manager in Hendersonville.

Mr. Gaines is a native of Texarkana, Ark., and a graduate of Georgia Institute of Technology. Before joining Duke Power in 1928, he was with Westinghouse Electric & Mfg. Co., in Sharon, Pa., and Florida Power Corp., in St. Petersburg.

Mr. Yarbrough joined Duke Power Co. in Greensboro in 1949 after his graduation from North Carolina State College. He is a native of Salisbury, N. C.

Anthony Maladra has been appointed sales manager, **K S M Products, Inc.,** Stud Welding Division, Merchantville, N. J. His appointment was announced by Frank K. Kelemen, president and general manager of the company.

Mr. Maladra has been associated with K S M for over six years. He formerly represented the company as district engineer in the Detroit area and has been assistant sales manager since 1952. He is a graduate engineer of Purdue University and is a member of the American Welding Society.

Monarch
RENEWABLE FUSES

One dependable quality
with BETTER PROTECTION
...OVER A LONGER OPERATING PERIOD
...AT THE REGULAR FUSE PRICE

This is the Monarch LONG LASTING *Renewable* ferrule type fuse

Discriminating users have specified these fuses for many years because of their QUALITY CONSTRUCTION *permitting easy access for cleaning and speedy Mon-o-lag link replacement*

Because Monarch Fuses are made from raw material to final inspection under our own QUALITY CONTROL—we are able to make strong claims and GUARANTEE long service.

A complete line of knife blade and ferrule type renewable and one-time fuses; plug fuses and spring clips.

Specify Monarch Fuses *for improved* FUSErvice

Monarch
ELECTRIC CORPORATION
Jamestown, New York

TURN MINUTES INTO YEARS OF *Protection*

at the vital points of overhead conductors

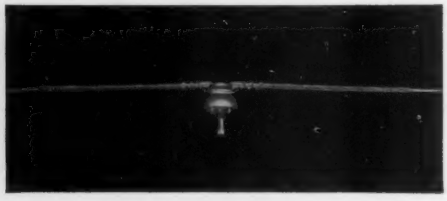
fine FANNER

SUPERFORMED ARMOR RODS

are easily applied . . . provide positive full-length grip and absolute uniformity of application

Fine Fanner SUPERFORMED Armor Rods offer the economical way for positive, lasting protection of overhead transmission and distribution lines. Their INSTALLED cost is so small compared with the service failures they prevent, it pays to install them at all points where vibration damage is likely to occur.*

Armor rods are easy to apply.



Completed armor rod installation.

Whenever you need accessory items for overhead conductors you'll do far better by standardizing on fine Fanner SUPERFORMED products. Each product in the Fanner SUPERFORMED line is carefully engineered and accurately manufactured. Highest quality materials provide long service life. Special packaging insures safe delivery and protection in storage. With all their extra features, Fanner SUPERFORMED products cost no more than ordinary products.

Armor rods and other products in the SUPERFORMED line are fully described in current literature. Write today for your copy.

**Where spans are short and tensions low, use Fanner SUPERFORMED lineguards.*

Licensed for use under patent No. 2,275,019.

THE FANNER MANUFACTURING CO.

Electrical Products Division

BROOKSIDE PARK • *Established 1894* • CLEVELAND 9, OHIO

Telephone: SHadyside 1-6000

Fine Fanner Superformed

AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES

TAP ARMOR | PLASTIC FANNGUARDS | PATCH RODS | FANNGRIPS

Sid Wrightsman, Jr., of Chamblee, Ga., has joined the staff of **Electrical South** and will serve as associate editor. Mr. Wrightsman graduated from the University of Texas in 1947

Sid Wrightsman, Jr.

with a bachelor of journalism degree. Directly after graduation, he served on the editorial staff of the *Galveston (Texas) Tribune*. He then became public relations director for the Arkansas Medical Society and editor of the Society's journal. From that position he came to the Medical Association of Georgia. He edited the Association's journal and was later made executive secretary.

R. E. Schuler has been elected chairman of the board of **Anderson Electric Corporation** of Birmingham, Ala., it was recently announced. Mr. Schuler was formerly president of the

R. E. Schuler

company. He has been associated with Anderson Electric for 32 years.

Succeeding Mr. Schuler as president is **Thomas H. Fox.** Mr. Fox, formerly executive vice-president, assumes the additional duties of treasurer and general manager of the company.

Other executive appointments include election of **John H. Schuler** as vice-president and secretary; and **R. L. Lock,** vice-president.

Free bulletins

Ruby-Philite Corp., 32-02 Queens Blvd., Long Island City, N. Y., has issued a 400-page catalog covering its over-all line of **fluorescent and incandescent lighting fixtures** for industrial and commercial requirements.

The book features many lighting innovations including new slim-dimension latchless fluorescent troffers, and incandescent displayolites in a full range of decorator colors for accent lighting. Complete specification and illumination data are given. Designed for easy fixture selection and ordering.

For additional data, ask for item B-213, using the coupon on page 95.

A new vest-pocket edition of the **Venturafin Unit Heater Handbook** is now available from **American Blower Corp.,** Detroit 32, Mich. The 64-page 3½ x 5¾-inch illustrated handbook (Bulletin 9417) contains specifications and operating characteristics as well as installation and application data for the complete Venturafin line.

Included in the new pocket handbook are such important data as capacity tables, dimensions, engineering specifications, external ductwork suggestions, mounting heights, piping diagrams, pipe sizes, sound ratings and wiring diagrams.

For additional data, ask for item B-214, using the coupon on page 95.

Descriptive data on G-E **step voltage regulators** are supplied in two new booklets available from **General Electric** apparatus sales offices or from the company headquarters, Schenectady 5, N. Y.

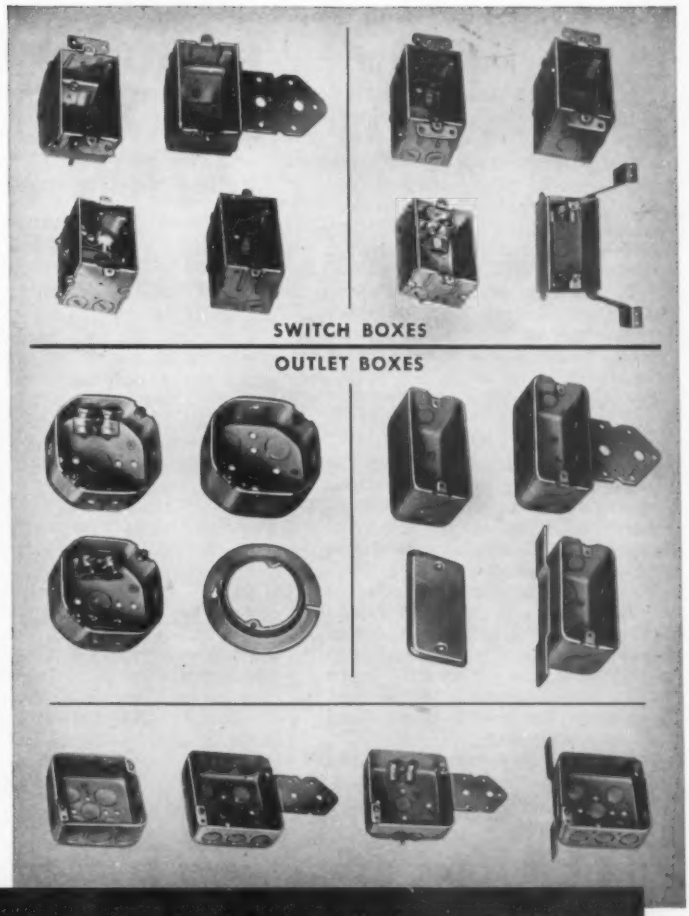
The illustrated booklets cover design features, applications, wiring diagrams and electrical data for 20 single-phase ratings (publication no. GEA-5752C) and 77 three-phase ratings (GEA-6552).

Both brochures on step regulators plus one on induction feeder regulators are included in a single package "Your Guide to Profitable Voltage Regulation," GED-3133.

For additional data, ask for item B-215, using the coupon on page 95.

Design features of A-C **intermediate outdoor oil circuit breakers** in ratings of 14.4 kv to 69 kv, 500 mva to 3500 mva, are described in a new bulletin released by **Allis-Chalmers Mfg. Co.,** 938 S. 70th St., Milwaukee 1, Wis.

The bulletin includes a description of the "Pneu-Draulic" operator, previously available only on the company's large tank type breakers, and the portable power operated hydraulic tank lifter along with the portable



For faster, easier box installations, specify the
KEYSTONE QUALITY LINE

You name it and Keystone has it! Square cornered, bevel cornered, and non-gangable switch boxes. Octagon, square, and handy type outlet boxes. Plus bar hangers and bar-box combinations to meet every need. What's more, every item in the Keystone Quality Line is loaded with time-saving, cost reducing features. Knockouts and pri-outs are designed for easy, split-second removal. BX or Romex clamps are preassembled and nested in the box for easier pulling of wires. Holes for clamp screws are extruded to eliminate stripping of threads. Switch and outlet boxes are available with brackets for side or face mounting to studs. And the popular octagon outlet boxes are offered separately or in combination with deep or shallow offset bar hangers.

Yes, when it comes to wiring devices and wiring installation equipment, you can count on Keystone for the items you *need when you need them.* A complete new catalog describes the entire Keystone Quality Line. Send for your free copy today!

It pays to figure on Keystone

KEYSTONE MANUFACTURING COMPANY
23328 SHERWOOD AVENUE • CENTER LINE (Detroit) MICHIGAN

. . . the Complete Line of Wiring Installation Equipment
SOLD ONLY THROUGH RECOGNIZED ELECTRICAL DISTRIBUTORS

battery operated unit for use on breakers with pneumatic or solenoid operators.

For additional data, ask for item B-216, using the coupon on page 95.

Mathias Klein & Sons, 7200 McCormick Road, Chicago 45, Ill., has just issued a completely revised catalog showing pliers and electricians' and linemen's **tools and equipment.**

Included is a new feature that will be of special interest to plier users. Dimensions of each part of every plier—length of handles, of cutting knives, of nose, width of head, point, etc.—are given in detail.

For additional data, ask for item B-217, using the coupon on page 95.

A new publication, Form 1082, has just been released by **Steber Manufacturing Co.,** Broadview, Ill. It illustrates and describes the complete Steber line of modern **service station lighting equipment** including Skyliners—the all aluminum fluorescent "T" Light, open or enclosed type—davit pole mounting, classic design straight aluminum poles, floodlights (incandescent or mercury vapor lamp), hinged poles and Steberlites, components for sealed beam lamp flood or spotlighting.

For additional data, ask for item B-218, using the coupon on page 95.

Technical books

for the electrical man

Applied measurements

By Isaac Fern Kinnard, Published by John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y., 600 pages, $15.00.

Covering theory, measurement of electrical quantities, and measurement of non-electrical quantities by electrical means, Applied Electrical Measurements was published recently by John Wiley & Sons. Isaac Fern Kinnard, manager of Engineering of General Electric's Instrument Department, was assisted by fourteen of his coworkers in preparing this broad study.

A two-part volume, Part One covers the measurement of electrical quantities; Part Two treats the measurement of non-electrical quantities. Included also are chapters on the history, theory, and functional analysis of measurement, and a review of the state of applications in selected fields.

Other chapters in Part One discuss current and potential difference; resistance, inductance, capacitance, and storage factor q; power and energy; phase angle, power factor, synchronism, and frequency; waveform; magnetism; transformers for measurement; and telemetering.

Part Two goes into the measurement of light, heat, sound, statics and kinetics, liquids and gases, and time.

"The book owes much of its value," writes Professor Charles L. Dawes in the Foreword, "to the fact that its author and his colleagues are actively engaged in the field, and have wide experience in research and in the development, manufacture, and applications of all types of measuring devices."

Applied Electrical Measurements is one of a series written by General Electric authors for the advancement of engineering practice.

Transistor circuits

By Louis E. Garner, Jr., Published by Howard W. Sams & Co., 2201 E. 46th St., Indianapolis 5, Ind., 430 pages, $4.95.

With the emergence of the transistor from the laboratory experimental state to its present status in the component field in radio as well as TV and other phases of electronics, it becomes increasingly necessary for the forward looking technician to acquaint himself with transistor circuits. This book serves that purpose.

It is a practical reference book covering over 200 basic circuits, practical applications and reference data on the uses of transistors.

The book is written in four parts. Part One is devoted to Laboratory Practice as far as transistors are concerned. Part Two covers Basic Circuits. These are circuits for experimental study or which may be used as "Building Blocks" in various combinations in the design of equipment.

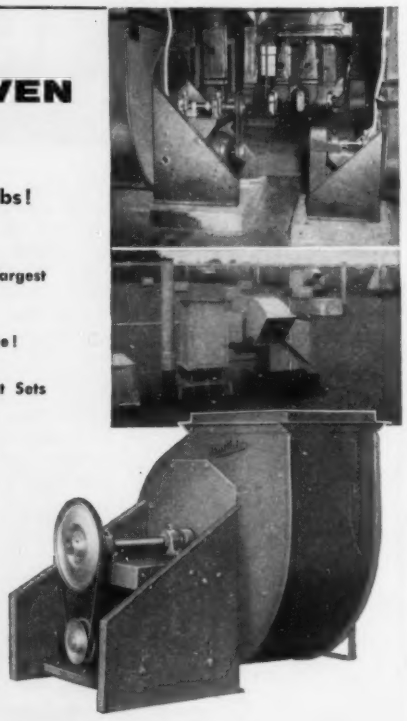
Part Three covers Circuit Applications. In some cases, practical construction hints are given. In all cases, values will be shown and component types specified. Part Four covers general Reference material of value in circuit work.

The new Transistor Circuit Handbook is available through electronics parts suppliers.

PRACTICAL • PROVEN • POPULAR

for "1001" commercial ventilation jobs!
"BUFFALO" BELTED VENT SETS

- **The same high performance built into the largest "Buffalo" Fans!**
- **Capacities up to 20,000 cfm!**
- **Non-overloading, regardless of system pressure!**
- **Easy "package" installation!**
- **Also, a line of efficient direct-drive Baby Vent Sets for your smaller capacity jobs!**



Top: Real flexibility possible with multiple unit installations.

Center: Outdoor or roof installation, with all-weather drive cover.

WRITE FOR BULLETIN 3720

BUFFALO FORGE COMPANY

210 Mortimer St., Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWER-EXHAUSTERS

Revisions of grounding, distribution handbooks

Published by AIEE, 33 W. 39th St., New York 18, N. Y., "Electric Power Distribution of Industrial Plants," 172 pages, $3.50; "Grounding of Industrial Power Systems," 40 pages, $1.20 (50 per cent discount on both publications to AIEE members.)

A completely revised edition of "Electric Power Distribution for Industrial Plants" has been announced by the American Institute of Electrical Engineers. The Institute also announced that a new book, "Grounding of Industrial Power Systems," is available for distribution.

The latter book is, in effect, an extension of Chapter Five of "Electric Power Distribution for Industrial Plants," popularly known as the Red Book, but is being issued as a separate periodical.

The Red Book, which is a revision of the edition first published in 1945, consists of 10 chapters on system planning, voltage considerations, system protection, fault calculations, grounding, power factor, power equipment, instruments, conductors and terminators, and relative cost of industrial distribution systems.

"Grounding of Industrial Power Systems" includes four chapters on system grounding, connections of frames, enclosures, etc., to grounded systems, the problem of static, and the problem of obtaining low resistance connections to the earth.

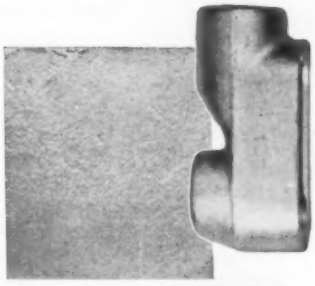
Prepared by the Subcommittee on Electric Power Distribution for Industrial Plants of the Industrial Power Systems Committee, the revised Red Book represents three years of work by 86 leaders in the field of electric power distribution. H. B. Thacker, Westinghouse Electric Corp., Pittsburgh, was chairman of the committee directing and coordinating the revision.

It was prepared "to promote the use of sound engineering principles in the design of electric power distribution systems for industrial plants." Although it is published by AIEE, the book is not an AIEE standard and recommendations are not mandatory or restrictive, it was pointed out by Mr. Thacker. More than 20,000 copies of the original publication were published, but it was apparent a few years ago that the publication needed revision.

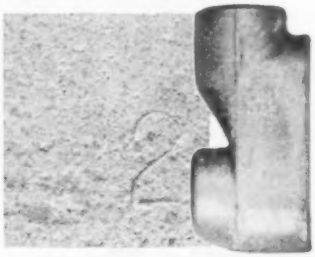
The purpose of the publication is "to bring to the attention of engineers, owners, and plant management the important features of well-designed electric distribution systems that result in satisfactory performance of utilization equipment and efficient operation of the plant."

HERE'S PROOF THAT KILLARK ELECTROLETS WILL LAST LONGER

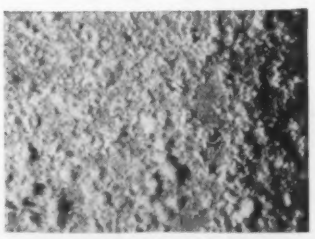
Newly Developed KPC-56 Protective Coating Adds Extra Resistance . . . Even for Highly Abnormal Atmospheres



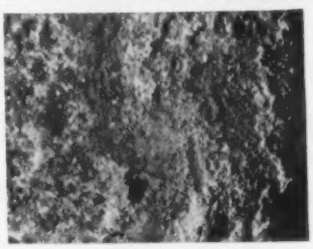
A Regular Killark Allumalloy Fitting Prior to Test



Killark Fitting with New Protective Coating (after 300 hours' exposure to salt spray)



Competitive Aluminum Fitting (after only 125 hour test period)



Cadmium Plated Iron Fitting (after only 125 hour test period)

Contact Your Killark Representative

Killark ELECTRIC MANUFACTURING COMPANY

VANDEVENTER AND EASTON • ST. LOUIS 12, MISSOURI

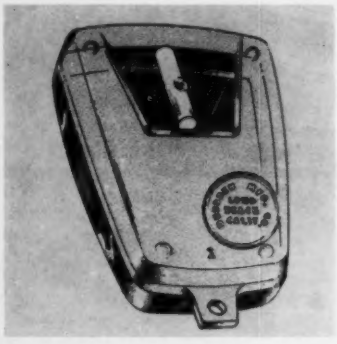
ATLANTA, 69 Mills St., N. W.
DALLAS, 1901 Griffin St.
BALTIMORE, 11 W. 25th St.

ENTRANCE FITTINGS • CONDUIT BODIES • FLUSH SWITCH FITTINGS
EXPLOSION PROOF FITTINGS • VAPOR TIGHT LIGHT FIXTURES
EXPLOSION PROOF LIGHT FIXTURES • SEALED BEAM FIXTURES

New products

Plastic magnicator for locating studs

A NEW super powerful magnicator, for locating studs and hidden metal objects, has been added to the line of



cement and plaster tools from Dresden Manufacturing Co., 2375 Walnut Ave., Long Beach 6, Calif.

The new magnicator, constructed of durable plastic, will permit the magnet to swing a full 360 degrees, assuring a metal pull of ¾ of an inch from the magnicator.

For additional data, ask for item P-219, using the coupon on page 95.

New 800 amp M-frame breaker approved by Underwriters

AN 800-ampere M-frame circuit breaker — first molded case circuit breaker to be approved by Underwriters' Laboratories for operation at this continuous current rating — has been introduced by I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.

The new circuit breaker extends the operating range of molded case breakers from 600 to 800 amperes, providing the higher continuous current rating which up until now required larger and more expensive equipment.

No larger than I-T-E's L-frame breaker rated at 600 amperes, the new 800-ampere breaker can be used in panelboards, power panels, switchboards, motor controls, bus duct plugs and individual enclosures.

The new breaker offers optional pressure connectors for either double or triple cable connections per phase within the circuit breaker case. Double 300 to 500 mcm cable connectors are available for breakers rated 600 and 700 amperes. Triple 300 to 400 mcm or special double 600 to 750 mcm connectors are available on breakers rated 800 amperes.

Exclusive 3-inch pole-center design dimensions permit easy accessibility for front cable or rear bus and stud connections.

For additional data, ask for item P-220, using the coupon on page 95.

Colored spot reflector gives "invisible" accent lighting

AN ALMOST invisible source of decorative gold, red, blue, or "complexion pink" light is provided by a colored aluminum spotlight reflector announced by Curtis Lighting, Inc., 6135 W. 65th St., Chicago 38, Ill.

The reflector is made for the firm's Vari-Spot recessed adjustable downlight. Used with a silvered-bowl 100-

watt white lamp, it casts soft illumination whose source is almost entirely concealed at normal viewing angles.

Recommended installations include accent lighting in restaurants, theaters, lounges, florist shops, window displays, banks, offices, and mortuaries, the company said.

A colored anodizing process is used to give the aluminum reflector a transparent coating. White light from the bulb is reflected back as the color of the coating, while the silvered bowl prevents direct white light from reaching the area illuminated.

For additional data, ask for item P-221, using the coupon on page 95.

Economical lug connects #14 thru 500 Mcm copper

A LUG-TYPE connector for economical terminating at service switches, terminal blocks, or other locations where space and cost are factors, has been introduced by the Burndy Corp., Norwalk, Conn. Called "KA-LUGS," the new connectors are available for copper conductors from #14 through 500 Mcm. Easy installation and elec-

Reach For
Test-Proven
ACCURATE TAPE
FRICTION .... RUBBER .... PLASTIC
Test-proven by International Testing Laboratories, Inc., for bond and tensile strength, climatic extremes, dielectric qualities, and elongation tests. Accurate exceeded all ASTM requirements. Rely on Accurate with confidence—Accurate is the choice of electrical men everywhere. Accurate Plastic Tape is Underwriters' Laboratories approved.
Send today for our most recent bulletin describing details.
ACCURATE MANUFACTURING CO.
GARFIELD, NEW JERSEY

utilities
rural co-ops
inspectors
consultants

CAN WE HELP YOU?

we manufacture specialized equipment for the following fields:

- Demand Control of Electric Heating
- Demand Control of Heavy Appliances
- Automatic Off-Peak Water Heating Control
- Industrial Automatic Demand Control
- Current Totalizing Service Protection
- Rural Service Protection & Demand Control
- Banked Secondary Distribution Protection
- Rural & Distribution Transformer Protection
- Automatic Transformer Overload Indication
- Street Lighting Protection & Control
- Phase Failure Protection

MARVIN BLACK & BILL TERRELL OF OUR SOUTHERN STATES FIELD OFFICE WILL GLADLY CALL AND DISCUSS YOUR PROBLEMS:

C.T. Electrical Controls Ltd.

BRANDON • MANITOBA • CANADA

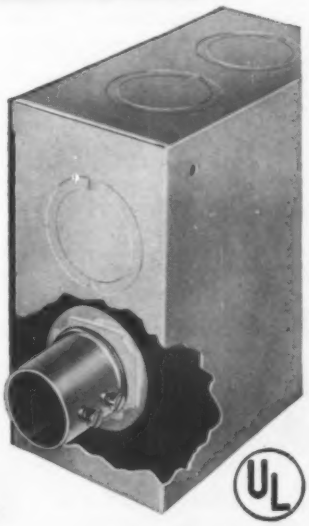
SOUTHERN STATES FIELD OFFICE,
Room 618, Florida National Bank Building,
St. Petersburg, Florida, Phone: 76938

This Electrician has just discovered

NEW 1¼" TUBE-WELD

SET SCREW FITTINGS

THE ONLY FITTINGS ON THE MARKET WITH PRE-SET SCREWS THAT REQUIRE NO BACKING OUT!



- **Pre-set Staked Screws. No backing out to insert conduit. No lost screws.**
- **One-piece solid welded steel tubing heavily plated.**
- **Self-centering box connector shoulders.**
- **Now available in ½", ¾", 1" and new 1¼" sizes.**

Write for FREE brochure to:
ELECTRIC TUBE PRODUCTS
A Division of Berger Machine Products
74-16 Grand Avenue
Maspeth (N.Y.C.), N.Y., DEfender 5-8000

State of Florida Representative
ELECTRA
4002 N. W. 2nd Avenue
Miami, Florida PLaza 8-9692

CONNECT WITH ETP FOR ECONOMY

trical dependability as well as low first cost are stressed by the manufacturer.

Smaller KA-LUGS are forged and larger sizes are cast of high-strength high-conductivity copper, with a plated steel socket screw for maximum compression. Compact design facilitates installation in limited space.

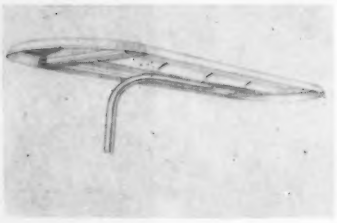
A screwdriver installs smaller KA-LUGS, an Allen wrench installs the larger sizes. The hex body is easy to hold during tightening. Because each KA-LUG takes a range of conductors, only five lug sizes are required to accommodate all conductors from #14 through 500 Mcm.

For additional data, ask for item P-222, using the coupon on page 95.

New line of fluorescent "T" lighting fixtures

THE LATEST development in the Skyliner group of horizontal fluorescent "T" lights by Steber Manufacturing Co., Broadview, Ill., is an open type, rounded end unit designed for straight or davit pole mounting.

Known as Series "T-1000," it is available with 6 or 8 Rapid Start or Slimline lamps. Two additional auxiliary 36" Slimline units measure 11' 6" long overall and are 42" wide. All aluminum canopy and box girder chassis are heliarc welded for maximum strength and wind resistance. Provision is made for mounting auxiliary spot or floodlamps to the top of the aluminum box girder cover.

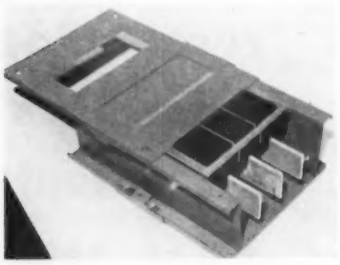


For additional data, ask for item P-223, using the coupon on page 95.

Improved plug-in bus duct eliminates insulator damage

A NEW DESIGN of insulator for plug-in bus duct for heavy duty commercial and industrial electrical distribution, that will withstand fault currents of 50,000 rms amperes, has been developed by Federal Pacific Electric Co., 888 N. Keyser Ave., Scranton, Pa., according to an announcement by J. C. Langaunet, manager of bus duct sales for the Eastern Switchgear Division.

"Tests for the performance of the new bus duct design," Mr. Langaunet reported, "have been conducted in an independent testing laboratory. The tests were conducted on type 50,000 WC plug-in bus duct loaded with 3-phase fault currents ranging between



46,000 and 57,000 amperes. Individual arcing fault tests were conducted to prove the product under extreme conditions of heat shock. An additional 2500 volt dielectric test was conducted."

For additional data, ask for item P-224, using the coupon on page 95.

New portable heater line features double-grill

A NEW and complete line of portable electric heaters has just been introduced by Everwarm, Inc., Knoxville, Tenn. The portable heaters complement the line of Everwarm wall insert heaters and Everwarm "Tuffex" all-purpose radiant cable.

Everwarm portable heaters, 240-volt, are available in 2000, 3000, 4000 and 4800 watts with the 208-volt portable units in 2000, 3000 or 4000 watts. Heating elements in all units carry the regular Everwarm five-year guarantee against burn-out with all other parts bearing an 18 months warranty against defective material and workmanship.

All heating cones are of the new Everwarm "Guide-Ray" design to focus extra radiant heat. A double-grill design lets convection heat pass through freely yet keeps grill surface temperature within a safe range. This is an important safety factor when used in homes with small children and helps prevent floor damage if the unit is accidentally upset.

Specify
KNOX
WIREHOLDERS
Increased Sales and Profits
• FOR DOLLAR VALUE
• FOR SERVICE
• FOR QUALITY
• FOR SAFETY
All Metal Parts Hot-Dip Galvanized
Extra-Sharp Screw Thread
Longer Pulley Action Wire-Hole
Metal in Tension Porcelain in Compression
No. 5009
ONE-PIECE REINFORCED WIREHOLDER
You'll find every KNOX product is made of fine quality materials... plus precision engineering and 33 years of manufacturing skill and "know-how"... a combination that assures you of a fine product, durable, safe and easily installed. For best results, specify KNOX.
Write for free Illustrated Catalog
KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE

ELECTRICAL SOUTH
806 Peachtree St., N.E.
Atlanta 8, Ga.

February, 1957

Gentlemen:

Please send me additional information on items mentioned in this issue of Electrical South. I have listed the key numbers of these items at right.

(Print Plainly)

Name ..... Title .....

Company .....

Address .....

City & State .....

☐ Enter my subscription to ELECTRICAL SOUTH and bill me at the special rate of three years for $3.00

FOR MORE INFORMATION—Use this handy return coupon for requesting additional information on products listed or bulletins announced. Be sure to give your firm name and your position or title. You may request additional information on utility products, pages 68-72; new electrical products, pages 92-96; or free bulletins, pages 89-90. Write in item numbers in coupon spaces above.

SOUTHERN SHAL-O-LITE LUMINAIRE

A shallow luminaire for use as an individual unit, for continuous rows or various patterns. The plastic side panels of ribbed, polished diffusing polystyrene illuminate the adjacent ceiling when surface mounted. The white translucent louver consisting of molded 5/8 inch cubicles provide 42 degree shielding both lengthwise and crosswise.

The Shal-O-Lite is available in two, four, or six lamp luminaires and can be ordered with Rapid start, Slimline, or starter type ballasts.

Remember, specify and satisfy with SOUTHERN Fluorescent fixtures.

SOUTHERN LIGHTING MFG. CO.

503 ELWELL ST. ● ORLANDO, FLORIDA

The handle is located on the rear panel of the heaters and never becomes heated. The entire rear panel and cone assembly is easily tilted away from the grill for easy, quick cleaning. Tan metallic finish blends with any decorating scheme.

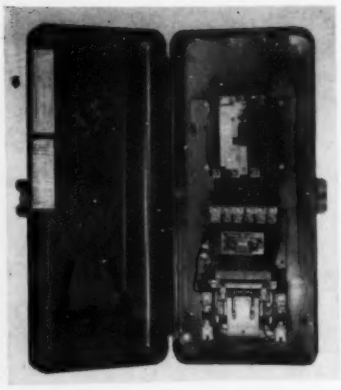
For additional data, ask for item P-225, using the coupon on page 95.

"E" frame circuit breaker for combination starters

A SMALLER "E" frame circuit breaker has been developed by the General Electric Co., Schenectady 5, N. Y. The General Purpose Control Department has now made this breaker standard on all its combination starters with breakers rated 250 volts, 100 amperes maximum.

The new design and also the 600-volt form now include provision for using the same type of handle mechanism currently used on combination starters with a disconnect switch. This mechanism mounts directly on the breaker. Meeting JIC specifications, this circuit breaker form of combination starter is engineered so that the starter handle can be padlocked only in the off position.

Now in production, the new "E" frame breaker has an interrupting capacity of 7500 amps and will be



supplied on General Electric CR 7008 combination starters, CR 7010 combination reversing starters, and CR 7108 combination multi-speed starters in sizes 0 - 3.

For additional data, ask for item P-226, using the coupon on page 95.

New Square D relay features small size

A NEW FOUR POLE machine tool relay which measures only 2-13/16" wide by 3-11/16" high has been introduced by Square D Co., 4041 N. Richards St., Milwaukee 12, Wisc. It is identified as Class 8501 Type DO-42 and is a companion device to the two pole Type DO-22. The two versions (both 10 ampere 600 volts) will handle the great majority of relay applications.

For mounting convenience and easy substitution when more poles are required, both relays have identical baseplates and can be mounted in-

terchangeably. Balanced construction minimizes wear on a single moving part. Plastic impregnated molded coil is unbreakable, operates cooler, is dimensionally stable and impenetrable by water and oil.

All contacts are clearly visible for normal inspection and maintenance. The device can be completely disassembled in a few seconds, simply by loosening two screws.

For additional data, ask for item P-227, using the coupon on page 95.

Inlet-to-outlet streamlining gives higher fan efficiency

THE RESULT of extensive development for Classes II thru IV heavy-duty industrial air handling (for total pressures of 6¾" water gauge and up), the new "Buffalo" Type BLH fan developed by Buffalo Forge Co., Buffalo, N. Y., offers an exceptionally high and broad efficiency range with a mechanical efficiency of 86%. This efficiency is obtained by the most complete inlet-to-outlet streamlining ever designed into a fan.

The inlet retains the smooth inlet bell used in the "Buffalo" Type BL fan for the past several years, but with further streamlining of the curved inlet guide vanes. These are cantilevered, with no center ring to cause turbulence. Thus, air is guided into the fan wheel in a smooth "spin" in the direction of wheel rotation with consequent improved and stabilized fan performance. In addition, "Buffalo" variable vanes can be substituted with no change in fan performance since they are also cantilevered and approximate the shape and design of the fixed vanes.

For additional data, ask for item P-228, using the coupon on page 95.

entrance cable fittings for 100-150-200 amp SERVICE

M&W

WATERTIGHT CONNECTORS 1", 1¼", 1½" and 2" Hub. ENTRANCE CABLE HEADS for 3-No. 3 to 3-No. 4/0. ENTRANCE CABLE STRAPS for 3-No. 2 to 3-No. 4/0. NON-WATERTIGHT CONNECTORS for 3-No. 2 to 3-No. 4/0. Just drop us a line on your company letterhead for latest, detailed catalog.

M&W Electrical Fittings

The M. & W. ELECTRIC MFG. CO., Inc.

EAST PALESTINE, OHIO

Code comment

(Continued from page 40)

which I didn't gather from his original question, I think he is correct in rejecting it as far as the Code is concerned.

Secretary Smith: Only, Mr. Brandon, for lamp holders and not ballasts. If you read 2113 very carefully, the first sentence will tell you what the intent is, and then the following (1), (2), (3), (4), (a) and (c) tell you the exceptions.

H. H. Watson: A 480 volt circuit, of course, is less than 300 volts to ground, so that requirement is met.

Q. W. Hargrove: No, sir. This is a delta system — it is strictly a 480 volt delta system. In this case, one of the phase wires was going to be grounded so it is 480 volts to ground. They make a ballast for it and it will work.

Secretary Smith: Is that a closed delta?

Q. W. Hargrove: Yes, Sir. On this closed delta it would be 480 volts to ground. If you tap the center tap of one transformer, you are about 390 volts to ground. You wouldn't be 277, that would be only on a "Y" system.

M. M. Brandon: This requirement in the Code was intended to be within limits of 300 volts to ground and have a neutral conductor. That was the intent of it. If you have got one that is over 300 volts to ground, it is a delta with one corner grounded. It was not contemplated here as far as the present Code is concerned. I would say it was ruled out.

Frank Camus: Let me see if I can analyze the answer to that problem. As I understood Mr. Brandon to say, it is not a violation of the Code to use mercury lighting fixtures on a 480 volt circuit, provided the conductors are not over 300 volts to ground. And in the case of Mr. Hargrove, the problem is that his circuits supplying these lamps have conductors of more than 300 volts to ground. Therefore, he is not permitted to use that type of installation.

Microwave system

(Continued from page 62)

many functions. The basic types of facilities which the system provides are:

(1) A dispatching party line linking all points in the system, including dispatch points, compressor stations, and four terminal offices.

(2) An operational party line for general operational traffic connecting field offices, maintenance centers, steam plants and substations.

(3) An operational private line for maximum availability of communications between any two stations in the system.

(4) A VHF radio control circuit which enables persons at fixed locations to talk with employes in any of 225 VHF-equipped vehicles.

(5) Telemetering channels which transmit impulses from generating stations and substations to the main control point at headquarters.

(6) Supervisory control circuits which enable a dispatcher to control operations and to make adjustments with changing load requirements.

(7) Carrier blocking and transfer trip circuits which give the Company adequate protection of essential facilities in any emergency.

Important aid to dispatchers

Conference voice channels which are provided for all major switching and generating points via microwave are used exclusively for dispatching purposes. Patching facilities on conference channels make possible important switching operations in minimum time. Other Company business, necessitating communications with distant points, is carried on dial channels which connect Company headquarters with interoffice PBX telephone equipment.

In the system load dispatchers' room, three console units tie-in to microwave and VHF circuits. Each of these units is complete and may be used to control any one of seven VHF repeater stations. Understanding and using the microwave facilities under a variety of circumstances has enabled system load dispatchers to isolate trouble in minimum time. Two other control points are available in the same building for emergency purposes.

On one wall of this room where electrical voltage registers on a battery of impulse-type, telemetering receivers enable the dispatchers to make optimum use of generating facilities. Telemetered data also provide a continuous check at interchanges on power purchased from and sold to neigh-

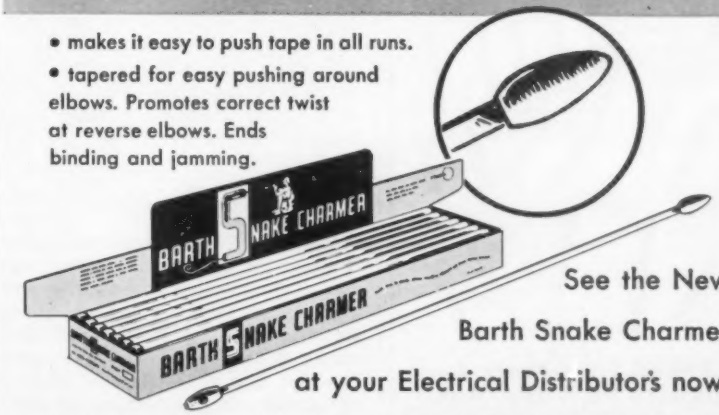
Amazing New Fish Tape Leader for Hand Tapes

BARTH SNAKE CHARMER

HIGHEST QUALITY—MOST DURABLE

EASIEST TO USE FISH TAPE LEADER ON THE MARKET!

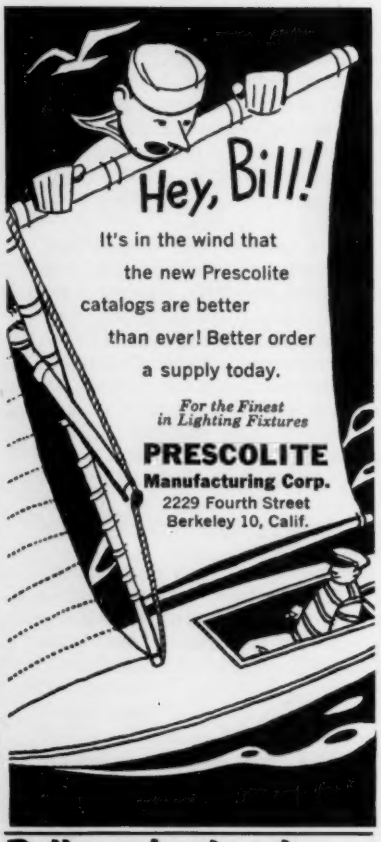
- makes it easy to push tape in all runs.
- tapered for easy pushing around elbows. Promotes correct twist at reverse elbows. Ends binding and jamming.



See the New Barth Snake Charmer at your Electrical Distributor's now.

From the maker of the famous Barth Electric Cable Puller.

THE BARTH CORPORATION 12661 Brookpark Rd., Cleveland 30, Ohio


Hey, Bill!
It's in the wind that the new Prescolite catalogs are better than ever! Better order a supply today.
For the Finest in Lighting Fixtures
PRESCOLITE
Manufacturing Corp.
2229 Fourth Street
Berkeley 10, Calif.

Follow the Leaders—
Use KING

RIGID-NOB
CABLE STAPLES

RIGID-NOB Design Provides Raised Driving Knobs — plus A Ridge Member To Assure Easy, Straight Installations

All sizes available in Bright Steel Stainless Steel - Cadmium Finish

KING MFG. CO. INC., JAFFREY, N.H.

boring electrical systems through wheeling arrangements.

VHF radio system

Included in the communications system is a network of permanent VHF base stations—some in distant offices, at power plants, and others on mountain tops functionas automatic relay stations. These operate into the microwave system to cover the area in which the Company construction crews and maintenance trucks operate. Radio equipped cars enable field personnel to keep in touch with the home office while on the job. Also, the home office knows where each car is located and, if trouble occurs in a given area, can contact the nearest service truck.

Two-way radio facilities are used by gas trucks, construction and maintenance crews, and by supervisory cars and service trucks.

VHF radio also serves the building crews which handle new construction and heavy equipment, and keeps in constant touch with line trucks, hole diggers, and cross-arm crews on line-stringing operations. Dispatchers use VHF for load dispatch control in their local power districts. The VHF circuits also serve Systems Radio Headquarters, which handles routine maintenance of all facilities.

VHF repeater stations operate at 153 mc and are arranged to cover the state in a semi-circular pattern from Yuma northward to the Grand Canyon and around to Tucson. To achieve maximum coverage, 153 mc base stations receivers repeat at 70 mc to provide VHF transmission from control points not having microwave. By using selective dispatching it is possible to contact a specific mobile unit in a given area. VHF mobile radio serves to keep the local areas in direct communication with each other, thereby making most efficient use of available men and equipment.

Future expansion

The effectiveness with which the microwave communication system has performed—its flexibility and its dependability—has made it an important factor in future planning. Today, microwave is used for the complete remote control of automatic substations at Bell Switch, Litchfield, Buckeye, and Apa, and has easily met the most stringent dependability requirements for such operations. Because reliabilities as high as 99 per cent have been consistently logged through the years to justify the Company's confidence in the microwave medium, present plans call for the remote automatic operation of the Company's hydro plants at Childs. After eight years experience, the Company feels that its decision to use microwave radio has been a practical one.

Many in the Company are of the opinion that effective communication has helped the utility fulfill its mission to provide customers with good service at reasonable rates and in a courteous manner. The microwave system is serving this purpose. Greater electrical distribution and better service are aiding community welfare across booming Arizona.

AIEE meeting

(Continued from page 56)

quite as efficient as its rival, PCM, in getting the maximum quality out of a given pulse rate, but when suitably doctored, it does not lag far behind.

"If the signal to be transmitted is of wide bandwidth, Delta Modulation reaches its limitations some time before PCM, and in the present state of the art, it would be exceedingly hard to make a delta system fast enough for commercial TV. Finally, Delta Modulation does not lend itself as readily to common equipment use as does PCM, and is not a good system where we want to code and decode many channels simultaneously.

"Delta Modulation will probably always have some place in the world of communications, but it is likely to be a more modest place than that of PCM."

Electric heat

(Continued from page 36)

radiant heat panels, portable stands, cable heating into residences in far greater numbers than we have heretofore seen. The potential is there.

Emergency lighting

(Continued from page 33)

ed as not themselves to create a fire or explosion hazard within the building.

Class B emergency lighting

5241. Class B emergency lighting shall be so arranged as to provide the required illumination

automatically in the event of any failure of normal lighting due to any fault within the building, such as opening of a circuit breaker or melting of a fuse due to short circuit due to fire or other cause or due to overloading.

This type of emergency lighting does not necessarily provide any safeguard against outside power failure, but does guard against light failure from causes within the building, and may be found suitable and reasonably adequate for many situations.

5242. Class B emergency lighting shall be either continuously in operation or shall be capable of repeated automatic operation without manual intervention.

5243. Class B emergency lighting may be provided by any method or combination of methods that will produce the desired results, subject to the approval of the enforcing authority, such as an arrangement whereby exit lights are on a separate electric circuit or circuits, used for no purpose other than exit lights and signs, such circuit or circuits being connected to the electric service wires ahead of any circuit breakers or fuses controlling the normal electric supply to the building.

For installation details see National Electrical Code, NFPA No. 70, Article 700.

Class C emergency lighting

5251. Class C emergency lighting shall be such as to maintain the required exit illumination automatically in the event of failure of public utility electric service or other outside source of energy.

This type of emergency lighting does not necessarily provide any safeguard against failure of lighting from causes wholly within the building, but may be found suitable for situations where the principal concern is to provide continued light in the event of outside power failure, such as with a public utility service particularly subject to interruption due to storms or other causes.

5252. Class C emergency lighting shall either be continuously in operation while the building is occupied, or shall come into operation automatically, with no appreciable delay, upon failure of current supply for normal lighting and, where automatic, shall be capable of repeated operation without manual intervention.

5253. Class C emergency lighting may be provided by any method or combination of methods that will produce the desired results.

A local electric generating system supplying a single building will meet the requirements for Class C if the local system is itself of adequate reliability, and where such a local system supplies all lights in a building no separate emergency lighting circuits or other special features are necessarily required to furnish Class C emergency lighting.

Where normal lighting is from a public utility or other outside source, it is necessary to have a local source of energy for emergency lighting, or for the entire building, such as an automatic starting electric generator arranged to supply the building in the event of outside power failure. In such a case however only a few additional features are needed to qualify the system for Class A emergency lighting, which is obviously preferable.

The following summary illustrates the treatment of emergency exit illumination for various occupancies covered by the Building Exits Code. Illumination from normal lighting sources is required in all cases.

Assembly occupancy: over 1000—Class A; 200 - 1000—Class B or Class C; under 200—no requirement except normal lighting.

Educational occupancy, where subject to night use—Class A or Class B.

Hospitals: Class A for exits, large wards, etc.; Class C for existing hospitals.

Hotels: over 500 rooms—Class A; 25 - 500—Class B; under 25—no requirment except normal lighting.

Mercantile occupancy: 30,000 sq. ft. or more—Class A or B; 3000 - 30,000 sq. ft.—Class A, B or C; 3000 sq. ft. or less, on street level—no requirement except normal lighting.

(For full details consult the 13th Edition of the Building Exits Code, available from the National Fire Protection Association, 60 Batterymarch Street, Boston.)

Talked about house

(Continued from page 30)

Space-conditioning: Family room and laundry center take up conventional hall space; free-standing closets and shelves serve dual purpose of storage and walls. Ceiling-high windows rim rooms with

Introducing
THE LATEST ADDITIONS
TO THE ACF
FAMILY OF FITTINGS

CLAMP-ON ENTRANCE CAPS

for both "E. M. T." & Heavy wall Conduit Sizes
¾"-1"-1 ¼"-1 ½"-2"

"E. M. T." CONNECTORS

ALL SIZES from ½"-2"

"E. M. T." COUPLINGS

ALL SIZES from ½"-2"

INSULATING BUSHINGS

ALL SIZES from ½"-4"

SERVICE CABLE PLATES

For 2/3 SEU and SEA
For 1" "E. M. T."

Write For Catalog And Latest Price Sheets

ATLANTIC CONDUIT FITTINGS COMPANY
BOSTON, MASSACHUSETTS

...just a few stars in
ELLIOTT'S COMPLETE
LINE OF FITTINGS

★ ★ ★ ★ ★ ★ ★ ★

★ ★ ★ ★ ★ ★ ★ ★

Write For Complete Catalog

ELLIOTT ELECTRIC
PRODUCTS CO.
1513 Olmstead Av., New York 62, N. Y.

ELECTRICAL
SALES
REPS.

PROMINENT MIDWEST MANUFACTURER OF MECH-ELECT. EQUIPMENT DESIRES REPRESENTATION ON COMMISSION BASIS IN SEVERAL EASTERN AND SOUTHERN TERRITORIES.

Reply Box 722

ELECTRICAL SOUTH
806 Peachtree St., N. E.
Atlanta 8, Georgia

outside light, but shield lower areas.

Sound-conditioning: Sound-absorbent plaster makes the ceiling; insulation blankets ceiling and fills wall studs. Master-slave communications system pipes music to every room and outside patios, also serves as inter-com.

Light-conditioning: Lighting is planned for indoor and outdoor work and play; with flexible control both by remote switches and dimmer system.

Safety-conditioning: Fire-alarm system, proper lighting, and air purifier are safety and health protectors.

Climate - conditioning: Year 'round weather is controlled automatically with only air and electricity by the heat pump.

Full Housepower: There's capacity to spare with a 200-ampere entrance switch and 44 circuits to supply today's requirements and provide for tomorrow's demands.

Space, work and time-saving are the advantages of the Electri-Living kitchen. All major appliances are built-in, with the automatic "appliance center" hung from the ceiling.

A built-in refrigerator and food freezer provide 14.6 feet of easily accessible storage space. A king-size 24-inch oven with fog proof window and a countertop surface cooking unit are space-savers. Dishwasher and garbage disposer are under the counters. On top is a built-in food mixer. The "appliance center" is the answer to many of today's "Housepower" problems—a central unit capable of supplying electric current for as many as five portable appliances at one time, providing automatic on—off cooking control, cord reel convenience, and five individually protected circuits. The "control center" is suspended from the ceiling alongside racks which keep appliances within easy reach.

To be most convenient, the laundry area is closest to baths and bedrooms. An "over-and under" washer-dryer team is stacked between the baths, removed from living and cooking center.

Next to the washer-dryer team is a 40-gallon quick recovery water heater that completes the laundry center. This washer and dryer measure only 25 inches wide. These units also can be installed side by side standing free, up on the wall, or under the counter top. Such flexibility of installation makes them adaptable to almost any counter and clothes bin arrangement.

Most unusual feature

Despite the glamor of new appliances and gadgets, the most unusual of the home's features is the lighting. This was planned for the architect by illumination engineer John Sharp Williams, of AP&L. Display time during the Parade of Homes last fall came at the peak of the Company's fall lighting promotion.

Color flood lighting is an innovation. Recessed flood lighting equipment in the ceiling of a free standing closet is equipped with color filters. Living room walls are white. To change color tones and room atmosphere, you change the filters. Indirect fluorescent lighting is employed in the playroom and living room. This consists of five 40-watt fluorescent lamps located in cove-like positions above free standing closets. All of the lamps are on a single circuit controlled by a special dimmer. Since these two rooms form the central portion of the home, a lighted pathway may be provided through the house by energizing this one circuit from the rear hall or from any front entrance way.

One switch-thermostat in the center of the home provides fingertip control of weather. The heat pump is a three-ton General Electric unit.

"Strip heaters," in the form of calrod elements are installed in the unit for supplemental wintertime heating. These units will operate automatically if the temperature drops more than two degrees below the desired level. Heat loss analysis indicated that the supplemental heating will be required only when outside temperatures drop to very low values.

Air purifier

To make it a "home of health," an electronic air purifier is installed between the heat pump and the return air duct. It is a Sun-Lite-Aire purifier manufactured by Sampson Chemical & Pigment Corp., Chicago. It provides elimination of odors, reduction of dust and pollen, and destruction of airborne germs, viruses and bacteria.

A new worksaver to the home market is a central, built-in vacuum cleaning system. The Vacu-Flo cleaner unit is located in the carport-workshop. Tubes run through the walls to the outlets in each room. A flexible hose with various

attachments can be plugged into the outlets—nothing to assemble and carry.

Flood lights under the eaves on all four sides of the home provide perimeter lights which flood illumination throughout all of the yard area.

Master bedroom lighting is accomplished from two ceiling lights placed so that they are in proper reading position at either side of the bed. These fixtures are retractable on reels so that they may be lowered from the ceiling to within 50 inches of the floor. The fixtures have three-way 50-100-150 watt lamps. Indirect bedroom lighting is accomplished by a dual purpose closet light. Fluorescent light in the ceiling of the free standing closet is mounted beneath a glass panel, serving as a closet light and as an indirect low intensity source for the bedroom.

Low voltage control switches for all lighting is also featured, giving the occupants controlled path of light from the rear entrance to the master bedroom. Master controls are situated in the carport and the master bedroom. The home also has dimmer controls for all lighting and perimeter lighting around the outside of the house which is controlled from inside the home.

The built-in radio communications system "pipes" music into any room. It can be used as an inter-communications system.

There is a fire alarm system which flashes lights and rings bells inside and outside the house. Thimble-size thermostat is attached to the ceiling of each room and connected to the inter-com system. If the temperature reaches 125 degrees, or combustion temperature, the alarm bell rings. If the occupants are away from home, the neighbors will hear the alarm.

High frequency

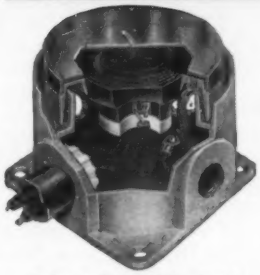
(Continued from page 29)

tion systems or equipment were cautioned to make a complete analysis of supply and distribution requirements prior to purchase of equipment or its installation. Vernon C. Geckler, of the General Motors Corp., Bristol, Conn., made the suggestion in a paper, "High Frequency Power and Distribution," presented before a session on Production and Application of Light.

"A new application of use for high frequency (higher than 60 cycles) for lighting purposes is

Latrobe PRODUCTS

FLOOR BOXES • WIRING SPECIALTIES



Adjustable Watertight Floor Boxes

All adjustable boxes are now equipped with a positive bond which makes them completely fire-proof.

There is nothing complex or intricate about "Latrobe" Floor Boxes and Wiring Specialties.

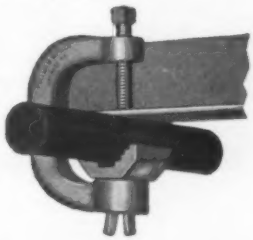
Their design and mechanism is kept simple and sure.

That is why "Latrobe" products are so quick to install and so trouble-free in operation.

Pipe or Conduit Hanger

The most economical and best pipe hanger sold today — rust-proof.

For hanging pipe ½" to 1½" thick to steel beams ⅜" thick.



Represented in the South by

CARY CHAPMAN & COMPANY
702 Whitehall St., S.W., Atlanta, Ga.
213 S. Front St., New Orleans 12, La.
1009 South Elm St., Greensboro, N. C.

F. P. WALTER COMPANY
4030 Chouteau Ave., St. Louis 10, Mo.

JIM ROBERTSON & COMPANY
2104 Irving Blvd., Dallas, Texas
1901 Commerce St., Houston, Texas

FULLMAN MANUFACTURING CO.

LATROBE . . . PENNSYLVANIA

NEW 1956 EDITION JUST OFF THE PRESS

ELECTRICAL ESTIMATING GUIDE

Covers Over 2000 Wiring Jobs

This new, entirely different estimating guide has 175 completely worked out charts.

Authentic, Time Saving—Easy to Use

This book is easy to use—it has no complicated mathematics or formulas to work over. You merely determine the nature of the wiring, check it in the BLUE BOOK OF ELECTRICAL ESTIMATING and there's your answer—it's the simplest estimating book ever written.

FREE NATIONAL ELECTRIC CODE BOOK

Just For Examining Blue Book

This book was written by a successful electrical contractor and estimating engineer with over 20 years' experience. It has an entirely different method of determining estimates on wiring jobs. Electrical contractors, journeymen, architects, and engineers will find use for this book every day. Gives time required to do jobs along with complete labor charges in every state in the country. Order this book now at special introductory price of $7.75. As a special offer to Electrical South readers the publishers give a free copy of the latest National Electrical Code Book just for examining the 1956 Blue Book of Electrical Estimating.

ESTIMATING HANDBOOKS ASSOCIATES — DE KALB, ILL.

Send me the NEW BLUE BOOK OF ELECTRICAL ESTIMATING and the latest edition of the National Electrical Code Book for 5 days free trial. I understand I may return the book within 5 days and owe nothing. If I keep it I will pay $7.75 plus postage for shipping. I keep the Code Book FREE even if I return the Blue Book of Electrical Estimating.

NAME

ADDRESS

TOWN ZONE STATE

☐ I enclose $7.75 to save shipping cost.
☐ Send C.O.D. I'll pay postman $7.75 plus C.O.D. fee on delivery.

February, 1957

creating considerable interest for industrial application," said Mr. Geckler, "and this application can expand very rapidly in the next few years."

The various factors to be carefully considered in high frequency purchase and installation, Mr. Geckler indicated, include motor generators, converters, frequency multipliers, voltages and frequencies, radio interference, and line losses and controls.

"Equipment manufacturers can be very helpful," said Mr. Geckler, "as they have available high frequency data which they will furnish upon request."

Electrical surveys

(Continued from page 24)

able and efficient operations.

For the many electrical engineers who are faced with the problems of a survey for the first time, he suggests that the most important step in a survey is to establish why it is needed. Almost invariably, said Mr. Rollins, the reason is one of the following:

(1) Operating costs are too high.

(2) Safety of personnel and equipment is inadequate.

(3) Load has been increased by expansion of facilities in existing buildings or in additions.

After establishing reason for the survey, Mr. Rollins said, it is necessary to examine existing conditions. Primary consideration should be given to:

(1) Type of service entrance or generating facilities (or both), including capacity, location and characteristics.

(2) Type of distribution, including wire and cable, as well as equipment, such as switchboards, panels and switches.

(3) Type of location of loads, with particular emphasis on large motors and panels or other load centers.

Mr. Rollins emphasized that collection of data is the most important phase of the survey. It is also important, he said, that the engineer collecting the information be familiar with the materials and problems. He suggested that after the drawing of existing conditions has been made, based on field sketches and data, the engineer return to the plant with the drawing and make a final check or verification before starting the analysis and planning modifications. When all relevant information is at hand, it is analyzed within the frame work of the survey's purpose.

A typical survey of a relatively small New England leather goods manufacturer and resulting changes made in the electrical power distribution system was cited by Mr. Rollins as an illustration of the effect of such a procedure. The new distribution system, the need of which was shown by the survey, resulted in cost per kilowatt hour of $.0182, compared with $.0214, a saving of $103 per month, or 15 per cent. These savings, plus those in other equipment, in production, increased safety to personnel and greater capacity of the power system, were incurred at a cost of $2,000 for the survey consulting fee and $14,600 for making the changes.

Distribution economics

(Continued from page 27)

volt systems can save another $2 per kva.

Primary disconnect switch costs approximate 5-11% of the system, ($1.75 to $7.27 per kva). These can be minimized by using the optimum number of transformers (saving $2.49 per kva), by using unfused disconnects rather than fused selector switches (saving $2.40 per kva), and by chosing proper primary voltage (saving $0.63 per kva).

Floor area for substation and power load center costs approximate 5-8% of the system, ($2.39 to $4.90 per kva). Locating these in the least expensive satisfactory space near load centers can save $2.27 per kva. Using primary voltage for large motors where practical can save an additional $0.24 per kva.

Primary circuit protection costs approximate 4-27% of the system, ($1.34 to $18.20 per kva). To reduce these, use the optimum number of transformer (saving $6.27 per kva), use fuses rather than circuit breakers (saving $4.35 to $10.14 per kva), choose the proper primary voltage (saving $0.45 per kva).

Service circuit breaker costs approximate 3-9% of the system, ($1.91 to $2.38 per kva). Choosing the proper primary voltage can save $0.84 per kva.

Excess secondary feeders to load centers cost 2-3% of the system cost. These can be minimized by locating transformers near load centers (saving $0.86 per kva), and by using optimum feeder sizes.

Conclusions

There are many factors which will affect the first cost of industrial power distribution systems, and many ways in which the electrical engineer can reduce the required initial investment. Consideration of factors other than economics, of first cost may lead to the selection of components on the

When you're looking for wiring devices, it's Circle F for Quality, Service and Price.

For full information, in Southeast, contact Hopper & McCoy, Atlanta, Greensboro, Miami.

CIRCLE F MFG. CO. Trenton 4, New Jersey

It doesn't Cost It PAYS to use

HELWIG CARBON BRUSHES

SPEED INSTALLATION
INCREASE BRUSH LIFE
CUT MOTOR DOWN TIME
SLASH MOTOR MAINTENANCE

HELWIG SPEER **HELWIG CO.** CARBON PRODUCTS
2502 N. 30th Street
MILWAUKEE, WISCONSIN

basis of value rather than price. It is necessary to study what and where the costs are in order to evaluate these factors. A method has been proposed for combining preliminary engineering and estimating work in order to accomplish this. Such studies should establish within reasonable limits where savings can be safely made in capital costs with due consideration to system safety, simplicity, service continuity, flexibility, regulation, efficiency, operation, and maintenance. These studies will also indicate what the approximate magnitude of these savings may be.

System renovation

(Continued from page 25)

lead in the spout between the melting pot and the auto-plate solidified overnight. This occurred despite a constant building temperature. By wrapping a flexible stainless steel calrod with a three-step temperature switch around the spout, lead remained molten and ready for use the following morning with any building temperature.

A unique system for setting up type has been patented by the Wall Street Journal enabling press information to come in on teletype machines and be electro-mechanically transmitted to linotypes for automatically seting up type.

Illumination increased

The lighting system was very important. Throughout the office area, composing room and editorial rooms an average of 80 - 100 foot-candles was established at desk level from continuous rows of four-tube slimline louvered fixtures.

Good illumination was similarly vital in the stereotype, press and mailing rooms where lighting was brought to 50 - 60 foot-candles.

Several troughs were run from power panels over equipment with flexible multiple-conductor rubber cord to various pieces of equipment so that flexibility could be maintained in the event of rearrangement or addition of equipment.

A smooth - running, modern branch of the Wall Street Journal, the latest office to be added to their growing organization, now meets the increased circulation of this financial newspaper.

Better installations in less time

Simple, quick to install

BLACKHAWK 540 BOX SUPPORT

stays rigidly in place

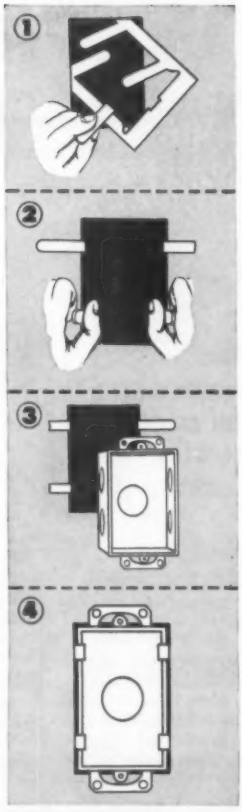
The Blackhawk No. 540 one piece box support slips into the wall opening and tabs are bent back to hold it in place. After the switch box is installed, the tabs are bent to the inside of the box squeezing it firmly in place. It's that simple and quick.

It makes a permanent installation because the Blackhawk 540 box support is a large single piece . . providing rigid, unified support. It does not wiggle or saw because it is parallel to the wall.

For simple, quick, permanent switch box installation, specify Blackhawk No. 540 box support. Ask your electrical distributor for Blackhawk.

Blackhawk Industries

BLACKHAWK INDUSTRIES
DUBUQUE, IOWA



FOR MORE SATISFIED CUSTOMERS

Go Buy the Cable that Beats All Competition!

AMERICAN *Bonded* ARMORED CABLE

Working electricians like to install American Bonded Armored Cable because it's easier to handle. They say its flexibility makes installation easy even in the hard-to-reach locations. And its overall quality makes it more economical in the long run. For an armored cable that answers all your cable problems, stick with American Bonded.

AMERICAN METAL MOULDING CO.

146 Coit St. **Irvington 11, New Jersey**

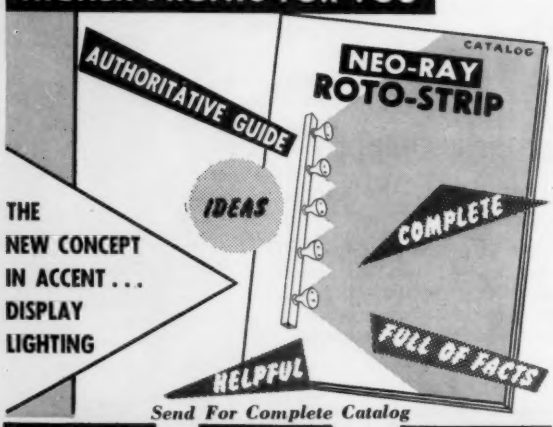
Atlanta Warehouse
C. C. MYRICK
516 Elm, N. W.
Atlanta, Georgia

Houston Warehouse
PEABODY BROTHERS
240 Shea St.
Houston 2, Texas

Dallas Warehouse
PEABODY BROTHERS
3015 Taylor St.
Dallas, Texas

One Fixture Cost . . . One Installation Cost
NEO-RAY ROTO-STRIP
C.S.A. APPROVED Pat. Pend.

HIGHER PROFITS FOR YOU



THE NEW CONCEPT IN ACCENT . . . DISPLAY LIGHTING

Send For Complete Catalog

Kansas • Missouri
Bob Anderson Company
4908 West 72nd St.
Kansas City 15, Mo.

Arkansas • Louisiana
Mississippi • West Tenn.
Pierre E. Bagur, Jr. & Co.
International Trade Mart
New Orleans 12, La.

Texas • Oklahoma
Walter J. Huemmer
Dallas Transfer &
Terminal Warehouse Bldg.
Dallas 2, Texas

Kentucky
Swan Sales Company
1105 Chestnut St.
Ashland, Ohio

Alabama • Florida
Georgia • N. Carolina
S. Carolina • Virginia
East. Tenn.
Walter F. Nelson
Bona Allen Bldg.
Atlanta 3, Ga.

E. Missouri • S. Illinois
Elmer E. Scheetz Jr.
5513 Sunbury
St. Louis 20, Mo.

Mfrd. by: NEO-RAY PRODUCTS, INC., 315 E. 22nd St., New York 10, N. Y.

for the LONG PULL use

Y-ER EAS
Wire Pulling Lubricant

Only Y-ER EAS has all these features

- Creamy, non-corrosive lubricant. Never greasy or messy.
- Prevents sticking or setting. Specially helpful on saddles and turns.
- Does not run back on cables.
- Never harmful to hands or clothing.
- Permanently non-harmful to cables or conduit.

Write for descriptive booklet

GIVES THE SLIP TO—
Lead, Rubber, Braid or Synthetic Covered Cables

Improved Y-ER EAS tested and approved by the Underwriters' Laboratories, Inc.

AT ALL LEADING ELECTRICAL SUPPLY HOUSES

ELECTRO COMPOUND CO.
4151 W. 150th Street • Cleveland 11, Ohio

ADVERTISER'S INDEX

A

Accurate Mfg. Co. 92
Adalet Mfg. Co. 108
Adam Elec. Co., Frank 51
Advance Transformer Co. ..... Second Cover
Air Conditioning Products Co. *
All-Steel Equipment, Inc. .... *
Allis-Chalmers Mfg. Co. 37, 71
American Blower Corporation *
American Coolair Corp. 107
American Metal Moulding Co. 103
American Steel & Wire Co. U. S. Steel Co. 58, 59
American Telephone & Telegraph Co. 75
Amplex Corporation ..... *
Anderson Electric Corp. ..... *
Appleton Elec. Co. ..... *
Arro Expansion Bolt Co. .... *
Arrow-Hart & Hegeman Elec. Co. 84, 85
Atlantic Conduit Fittings Co. 99

B

B & C Metal Stamping Co. 48
Barth Corporation 97
Benjamin Elec. Mfg. Co. .... *
Berko Elec. Mfg. Corp. ..... *
Berns Mfg. Co. ..... *
Blackburn Corp., Jasper ..... *
Blackhawk Industries 103
Briegel Method Tool Co. 20
Bryant Elec. Co. ..... *
Buchanan Elec. Products Corp. 105
Buffalo Forge Co. 90
Bulldog Elec. Products Co. 14, 15
Burndy Engineering Co. ..... *
Bussman Mfg. Co. ....Back Cover

C

C. T. Electrical Controls, Ltd. 93
Carol Cable Co. Div. of The Crescent Co., Inc. .... *
Cavalier Corp. ..... *
Ceilheat, Inc. 35
Certified Equipment Mfgrs. (Ballasts) 11
Champion Lamp Works ..... *
Chance Co., A. B. ..... *
Chelsea Fan & Blower Co. ... *
Circle F Mfg. Co. 102
Classified Ads 100
Columbia Cable & Elec. Corp. *
Consolidated General Products, Inc. ..... *
Cordomatic Div., Vacuum Cleaner Corp. ..... *
Cornish Wire Co. 9
Crouse-Hinds Co. ..... *
Curtis Lighting ..... *

D

Day-Brite Lighting, Inc. ..... *
Delta Star Elec. Div., H. K. Porter Co., Inc. ..... *
Diamond Wire & Cable Co. .. 21
Distribution Assemblies Department General Elec. Company ..... *
Duncan Elec. Mfg. Co. ..... *
Dutch Brand Div., Johns-Manville Corp. 6

E

Eastern Fixture Co. ..... *
Electric Tube Products 93
Electro Compound Co. 104
Electromode Corp. ..... *
Elgo Shutter & Mfg. Co. ..... *
Elliot Elec. Products Co. 100
Essex Wire Corp., Paranite Wire & Cable Div. ..... *
Estimating Handbooks Associates 101
Evans Metal Co. 107
Everwarm, Inc. ..... *

F

Fanner Mfg. Co. 88
Fasco Industries, Inc. ..... *
Fast-Lok ..... *
Fisher-Pierce Co. ..... *
Fluorescent Fixtures of California ..... *
Fullman Mfg. Co. 101
Furnas Elec. Co. 86

G

Gedney Elec. Co. ..... *
General Cable Corp. 81
General Electric Co., Circuit Protective Devices Dept. .. *
General Electric Co. Distribution Assemblies Dept. ..... *
General Electric Co. (Lamp Div.) 17
General Elec. Co. Wiring Device Department ..... *
General Electric Co. Wire & Cable—Construction Materials Div. ..... *
General Electric Co. Distribution Transformers Dept. ..... *
Gibson Mfg. Co. ..... *
Globe Lighting Products, Inc. 47
Graybar Elec. Co. ..... *
Greenlee Tool Co. ..... *
Guth Company, Edwin F. .... *

H

Helwig Company 102
Hindle Transformer Co. ..... *
Holan Corp., J. H. 4
Hubbard & Co. 55
Hubbell, Inc., Harvey ..... *

I

Ideal Industries, Inc. 83
Ideal-Simplet Fittings, Inc. .. *
I-T-E Circuit Breaker Company 18, 19

J

Jackson Mfg. Co., W. L. .... *
Jay Lighting Mfg. Co., Inc. .. *
Johns-Manville Corp., Dutch Brand Div. 6

ADVERTISER'S INDEX

K

Kearney Corp., James R. 45
Keystone Mfg. Co. 89
Killark Elec. Co. 91
King Mfg. Co. 98
Knox Porcelain Co. 94
Kreuger & Hudepohl ..... *
Kuhlman Electric Company .....Front Cover

L

Leviton Mfg. Co. ..... *
Light & Power Utilities Corp. 2
Litecor, Inc. ..... *

M

M & W Elec. Mfg. Co., Inc. .. 96
Marcus Transformer Co., Inc. *
Marlou Lights, Inc. 41
Marviray, Inc. ..... *
Massey, Inc., A. H. ..... *
McCleskey Mfg. Co., Ford ... *
Miller Company, The ..... *
Moe Light, Inc. ..... *
Monarch Electric Corp. 87
Murray Mfg. Corp. ..... *

N

National Elec. Products Corp. *
National Lighting Bureau .... *
Neo-Ray Products, Inc. 104
Norris Thermador Corp. ..... *
North American Electric Lamp Co. ..... *
Nutone, Inc. ..... *

O

O Z Electrical Mfg. Co., Inc. .. *
Orangeburg Mfg. Co. Inc., ... *

P

Paine Company ..... *
Paranite Wire & Cable Div. Essex Wire Corp. ..... *
Pass & Seymour, Inc. ..... *
Peerless Elec. Co., Fan & Blower Div. 79
Perfeclite Co. ..... *
Petersen Engineering Co. .... *
Phelps Dodge Copper Products Corp. 67
Plymouth Rubber Co., Inc. .. *
Porcelain Products, Inc. .... *
Preformed Line Products Co. 13
Prescolite Mfg. Inc. 98
Progress Mfg. Co. ..... *
Pryne & Co., Inc. ..... *
Pyle-National Co., The ..... *
Pyramid Instrument Corp. ... *

R

Remcon Div. Pyramid Inst. Corp. ..... *
Republic Steel Corp. 53
Revere Elec. Mfg. Co. ..... *
Rockbestos Prods. Corp. 43
Rome Cable Corp. 77
Royal Elec. Co. 16
Russell & Stoll Co. ..... *

S

Sangamo Elec. Co. ..... *
Sherman Mfg. Co., H. B. .... *
Simplet Fittings Div., Ideal Industries ..... *
Simplex Wire & Cable Co. 63
Slater Elec. & Mfg. Co. ..... *
Smithcraft Lighting Div. 73
Sorgel Elec. Co. ..... *
Southern Electrical Corp. ... *
Southern Lighting Mfg. Co. .. 95
Southern States Equip. Co. .. *
Southwire Company 1
Spang-Chalfant Div. National Supply Co. ..... *
Sperti Faraday, Inc. ..... *
Square D Co. .....Third Cover
Steber Mfg. Co. ..... *
Steel City Elec. Co. 7
Stephens Mfg. Co., M. 108
Stonco Elec. Products Co. .... *
Sunbeam Lighting Co. ..... *

T

Tennessee Coal & Iron Div., U. S. Steel Co. ..... *
Theil Tool & Engineering Co. *
Thermador Elec. Mfg. Co. A Division of Norris Thermador Corp. ..... *
Thomas & Betts Co. 69
Titan Mfg. Co. ..... *
Tomic Sales & Engineering Co. 38
Trade-Winds Motorfans, Inc. .. *
Triangle Conduit & Cable Co. 5

U

United States Rubber Co. Mechanical Goods—Wire & Cable ..... *
Union Insulating Co. ..... *
United States Steel Co. American Steel & Wire Div. 58, 59
Tennessee Coal & Iron Div. ..... *

V

Virden Co., John C. ..... *
Vulcan Elec. Co. ..... *

W

Wadsworth Elec. Mfg. Co. .... *
Walker Electrical Co. ..... *
Want Ads 100
Weaver Co., J. A. ..... *
Western Insulated Wire ..... *
Westinghouse Elec. Corp. ... *
Wheeler Reflector Co. ..... *
Wiremold Co. ..... *

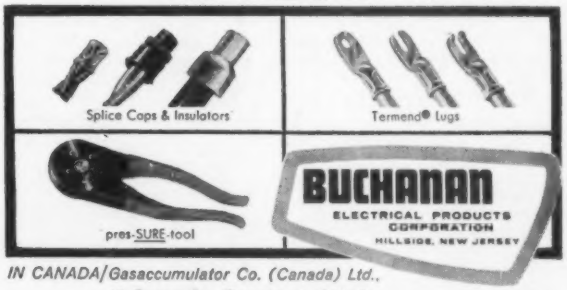
Y

Youngstown Sheet & Tube ... 57

BUCHANAN Nylon Insulators, with internal metallic locking rings, snap securely and permanently over Buchanan Splice Caps. Easily and quickly installed even in extremely cold weather - even on flexible wire

- Just two sizes of Splice Caps and Insulators splice all wire combinations from 2 #18's through 3 #8's or 2 #6's.
- The Buchanan C24 pres-SURE-tool installs both sizes of Splice Caps — and also installs Termend lugs on #16 through #8 wire.
- Insulators are approved for 600 volts on building wire, 1000 volts in fixtures in applications to 105°C.
- Ask your wholesaler or write for Bulletin. S-2

Here's the complete pres-SURE-connector "package".



IN CANADA/Gasaccumulator Co. (Canada) Ltd., 12 Gower St., Toronto 16, Ontario

MANUFACTURERS' AGENTS

REPRESENTING OUR ADVERTISERS

This listing of Manufacturers' Agents is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. However, no allowance can be made for errors, or for failure to insert. We will appreciate your calling to our attention any corrections or omissions promptly. Only manufacturers' agents are listed here.

ALABAMA

Birmingham

Beaven, W. H.
M & W Elec. Mfg. Co., Inc. 96
Belcher & Assoc.
Buchanan Elec. Prods. Co. 105
Chapman & Co., Cary
Royal Elec. Co. 16
Eshelman & Co., Inc., Jos. W.
I-T-E Circuit Breaker Co. 18, 19
Howarth Co., Inc., J. L.
Fanner Mfg. Co. 88
Morrison, Robert S.
Frank Adam Elec. Co. .. 51

ARKANSAS

Little Rock

Brown, J. L.
Buffalo Forge Co. 90
Bryant, Henry
Killark Elec. Mfg. Co. ... 91
Gregory-Salisbury & Co.
I-T-E Circuit Breaker Co. 18, 19
Mid-South Assoc.
Keystone Mfg. Co. 89
Nichols, N. B.
Light & Power Utilities Corp. 2
Peabody Bros.
American Metal Moulding Co. 103
Stout & Co., Curtis H.
Kuhlman Elec. Co. .....Front Cover
Preformed Line Products.. 13

DISTRICT OF COLUMBIA

Washington, D. C.

Bradley Co.
I-T-E Circuit Breaker Co. 18, 19
Quick, James P.
Bulldog Elec. Products 14, 15
Steel City Elec. Co. 7

FLORIDA

Clearwater

Cooke & Assoc.
M & W Elec. Mfg. Co. .. 96

Coral Gables

Ackerman, J. H.
Briegel Method Tool Co. 20

Ft. Lauderdale

Evans, William T.
Atlantic Conduit Fittings Co. 99
Keystone Mfg. Co. 89
Webb, P. J.
Frank Adam Elec. Co. ... 51

Jacksonville

Belcher & Assos., Inc.
Preformed Line Products.. 13
Bronsvel, Robert Co.
Tomic Sales & Eng. Co... 38
Collins, John R.
Blackhawk Industries ...103
Smith & Co., Robt. P.
I-T-E Circuit Breaker Co. 18, 19
Ward Engineering Co.
Ideal Industries, Inc. ... 83

Kendall

Lott, Furna
Prescolite Mfg. Co. 98

Lady Lake

French, J. E.
Ceilheat, Inc. 35

Lake Wales

Black, Marvin J.
Elliot Elec. Prods. 100
Carter Agency, John
B & C Metal Stamping Co. 48

Miami

Belcher & Assos., Inc.
Buchanan Elec. Prods. Corp. 105
Preformed Line Products . 13
Berry McWhorter, Inc.
M. Stephens Mfg. Inc. ...108
Chapman & Co., Cary
Fullman Mfg. Co. 101
Electra
Electric Tube Products .. 93
Hopper & McCoy, Inc.
Circle F. Mfg. Co. 102
Lee-Smith Co.
I-T-E Circuit Breaker Co. 18, 19
Mellow, Jay
Globe Lighting Prods., Inc. 47
Suchman & Coulter, Inc.
American Metal Moulding Co. 103
Royal Elec. Co., Inc. 16
Turner, J. Carl
Furnas Elec. Co. 86

Mt. Dora

Hill, Kenneth H.
Smithcraft Lighting Div... 73

Orlando

Ward Engineering Co.
Ideal Industries, Inc. 83

South Miami

Turner, J. Carl
Furnas Elec. Co. 86

Tampa

Smith & Co., R. P.
I-T-E Circuit Breakers Co. 18, 19

GEORGIA

Atlanta

Belcher & Assoc., Inc.
Buchanan Elec. Prods. ...105
Berry Co., W. H.
M. Stephens Mfg., Inc. ..108
Boyd, Samuel G.
Helwig Co. 102
Chapman & Co., Cary
Fullman Mfg. Co. 101
Royal Elec. Co. 16
Dawes & Co., Edgar E.
Steel City Elec. Co. 7
Flanagan, Stephen J.
Allis-Chalmers Mfg. Co. 37, 71
J. H. Holan Corp. 4
Griffin & Griffin
Blackhawk Industries ...103
Keystone Mfg. Co. 45
Hinson, Walter M.
B & C Metal Stamping Co. 48
Hopper & McCoy, Inc.
Circle F. Mfg. Co. 102
Kennon, W. N.
Atlantic Conduit Fittings Co. 99
Ceilheat, Inc. 35
Koeln & Co., Geo. R.
Fanner Mfg. Co. 88
Landers Co., L. Morris
Accurate Mfg. Co. 92
Advance Transformer Co. .....Second Cover
Cornish Wire Co. 9
Loyd, Inc., Ernest T.
Killark Elec. Mfg. Co. ... 91
Macon, H. L.
Kuhlman Elec. Co. .....Front Cover
Preformed Line Products.. 13
Milner & Co., W. J.
Barth Corp. 97
Light & Power Utilities Corp. 2
Myrick, Jr., C. C.
American Metal Moulding Co. 103
Nash, Walter S.
Briegel Method Tool Co. 20
Nelson Sales Agency, W. F.
Neo-Ray Products, Inc. ..104
Underwood Co., John L.
American Coolair Corp. ...107
Woodyard, Charles L.
Prescolite Mfg. Co. 98

Avondale Estates

Bishop, Wm. F.
Elliot Elec. Products Co. 100
Tomic Sales & Eng. Co. .. 38
Junghans, H. L.
Frank Adam Elec. Co. ... 51

Decatur

Kuzell, R. J.
Southern Lighting Mfg. Co. 95

Rossville

Ledford, L. O.
Ceilheat, Inc. 35

KANSAS

Wichita

Zimmerman Sales Agency
Diamond Wire & Cable Co. 21
Helwig Co. 102

KENTUCKY

Louisville

Bullock, Thos. W.
Keystone Mfg. Co. 89
Chick & Co., L. P.
Southwire Co. 1
Esterle, Richard
Killark Elec. Mfg. Co. ... 91
Steel City Elec. Co. 7
Grimes, Gene
Killark Elec. Mfg. Co. ... 91
Steel City Elec. Co. 7
Weyhing, Louis
Light & Power Utilities Corp. 2

LOUISIANA

Metairie

Hauk, R. C.
Fanner Mfg. Co. 88
Roan, James
M & W Elec. Mfg. Co. .. 96

New Orleans

Bagur, Pierre
Neo-Ray Products, Inc. .104
Baldridge Co., Fred C.
Elliot Elec. Prods. Co. ..100
Chapman & Co., Cary
Fullman Mfg. Co. 101
Royal Elec. Co. 16
Colcock, Hutson
Republic Steel Corp. 53
Gregory-Salisbury & Co.
I-T-E Circuit Breaker Co. 18, 19
Hagan Co., E. J.
B & C Metal Stamping Co. 48
Prescolite Mfg. Co. 98
Jones-Philibert & Co.
Tomic Sales & Eng. Co., Inc. 38
Keller, W. J.
Frank Adam Elec. Co. ... 51
Kleinschmidt, C. C.
Smithcraft Lighting Div... 73
Levin & Assos., Al
Briegel Method Tool Co. 20
Lloyd, Chester R.
Circle F. Mfg. Co. 102
Naylor, J. E.
Triangle Conduit & Cable Co., Inc. 5
Ong, R. M.
Tomic Sales & Eng. Co... 38
Orlick, A. M.
Electric Tube Prods. 93
Peabody Bros.
Rome Cable Corp. 77
Ramond Co., Chas. K.
Atlantic Conduit Fittings Co. 99
Light & Power Utilities Corp. 2
Stout & Co., Curtis H.
Kuhlman Elec. Co. .....Front Cover
Preformed Line Products.. 13
Wheatley, W. W.
Killark Elec. Mfg. Co. ... 91
Steel City Elec. Co. 7

Shreveport

Butler & Land
I-T-E Circuit Breaker Co. 18, 19

MARYLAND

Baltimore

Auer, Robert P.
Fullman Mfg. Co. 101
Keystone Mfg. Co. 89
Bailey, Jr., T. H.
Prescolite Mfg. Co. 98
Barrington Assos.
Blackhawk Industries ...103
McCourt, Leo T.
Killark Elec. Mfg. Co. .. 91

Towson

Clements, Geo.
Monarch Elec. Corp. 87

MISSISSIPPI

Jackson

Gregory-Salisbury & Co.
I-T-E Circuit Breaker Co. 18, 19

MISSOURI

Clayton

Noser, Joseph A.
Prescolite Mfg. Corp. 98
Smithcraft Lighting Div. . 73

Kansas City

Anderson Co., Robert
Neo-Ray Products, Inc. ..104
Fleming & Co.
Fullman Mfg. Co. 101
Smithcraft Lighting Div....73
Grant, John
Southwire Co. 1
Hodges Co., Tom
Tomic Sales & Eng. Co... 38

MANUFACTURERS' AGENTS
REPRESENTING OUR ADVERTISERS

This listing of Manufacturers' Agents is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. However, no allowance can be made for errors, or for failure to insert. We will appreciate your calling to our attention any corrections or omissions promptly. Only manufacturers' agents are listed here.

Howe Co., W. F.
Circle F. Mfg. Co. 102
Steel City Elec. Co. 7
McCreary & Son, B. L.
Frank Adam Elec. Co. 51
Miller, Arthur G.
I-T-E Circuit Breaker Co. 18, 19
Kuhlman Elec. Co. .....Front Cover
Swihart, J. R.
Furnas Elec. Co. 86
Terry Organizations, Inc., Wm. B.
Killark Elec. Mfg. Co. .. 91
Thorsell, Carl
Prescolite Mfg. Co. 98
Ward Co., Chas. L.
Fanner Mfg. Co. 88
Wendegatz, L. G.
Preformed Line Products.. 13

Kirkwood

Martin Co., Ray
Tomic Sales & Eng. Co... 38

Springfield

Boggs & Co., Ivan
Fanner Mfg. Co. 88

St. Louis

Ajax Elec. Sales Co.
M. Stephens Mfg., Inc. ..108
Abreiter-Steele Co.
Steel City Elec. Co. 7
Andrews Co., Harry C.
Briegel Method Tool Co. 20
Bullivant, F. J.
Furnas Elec. Co. 86
Helwig Co. 102
Cleary, M. J.
Atlantic Conduit Fittings Co. 99
Myers & Son, R. E.
Circle F. Mfg. Co. 102
Rottman, O. H.
Frank Adam Elec. Co. ... 51
Stadnyk, Stephen
Ceilheat, Inc. 35
Walter, F. P.
Fullman Mfg. Co. 101
Wood & Anderson
Cornish Wire Co. 9

Webster Groves

Hinchman, R. F.
Killark Elec. Mfg. Co. ... 91

NORTH CAROLINA

Charlotte

Bothwell, Harold H.
Smithcraft Lighting Div... 73
Daughtridge, Robt. L.
Furnas Elec. Co. 86
Gilliam Co., E. H.
I-T-E Circuit Breaker Co. 18, 19
Lassiter Sales Co., W. H.
Atlantic Conduit Fittings Co. 99
Prescolite Mfg. Co. 98
Lombardi Co., E. F.
B & C Metal Stamping Co. 48
Ceilheat, Inc. 35
Lumpkin, J. P.
Bulldog Elec. Products .14, 15
Steel City Elec. Co. 7
Thurman Co., W. L.
Accurate Mfg. Co. 92
Advance Transformer Co. .....Second Cover
Cornish Wire Co. 9
Williams, K. L.
Bulldog Elec. Products .14, 15

Greensboro

Chapman & Co., Cary
Fullman Mfg. Co. 101
Royal Elec. Co. 16
Hopper & McCoy
Circle F. Mfg. Co. 102

Raleigh

Gill, Allen G.
American Metal Moulding Co. 103
M & W Elec. Co. 96

OKLAHOMA

Jenks

Parker Co., Wayne G.
Atlantic Conduit Fittings Co. 99

Lawton

Cox, C. W.
Southwire Co. 1

Oklahoma City

Cole Co., J. H.
Helwig Co. 102
Comer Sales Co.
Ideal Industries, Inc. 83
Hammon, Clyde V.
Light & Power Utilities Corp. 2
Sullens, Ray
Frank Adam Elec. Co. 51
Wilson Co., Floyd
Prescolite Mfg. Co. 98

Tulsa

Anderson Co., C. B.
Preformed Line Products.. 13
Peabody Bros.
American Metal Moulding Co. 103
Rome Cable Corp. 77
Peterson, V. H.
Bulldog Elec. Products .14, 15

SOUTH CAROLINA

Columbia

Engineer Sales Co.
Preformed Line Products.. 13
Richardson, James B.
Tomic Sales & Eng. Co... 38

Summerville

Voight, J. P.
I-T-E Circuit Breaker Co. 18, 19

TENNESSEE

Chattanooga

Graig-Owen
Light & Power Utilities Corp. 2
Hagan, W. J.
I-T-E Circuit Breaker Co. 18, 19

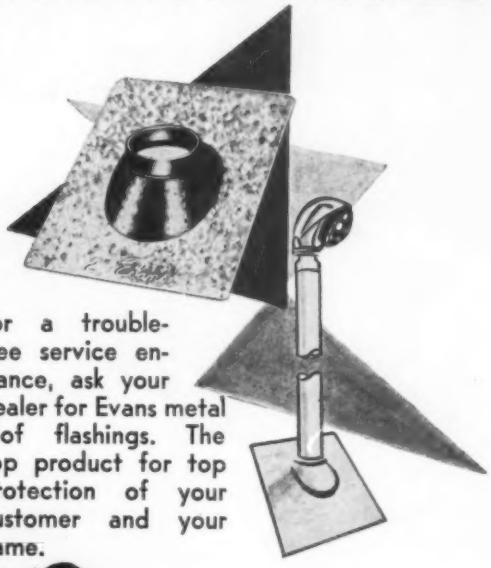
Knoxville

Pettyjohn Co., John G.
Kuhlman Elec. Co. .....Front Cover
Turbyville, Charles B.
Adalet Mfg. Co. 108

Memphis

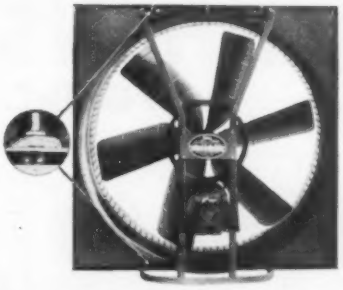
Beard, Hal P.
Light & Power Utilities Corp. 2

another top product
EVANS ROOF FLANGES



For a trouble-free service entrance, ask your dealer for Evans metal roof flashings. The top product for top protection of your customer and your name.

Evans Metal Co.
P. O. BOX 97—NORTHSIDE STATION
ATLANTA, GEORGIA



- Easier to Install
- New Quiet Operation
- Competitive Prices

COOLAIR Ventilating Fans

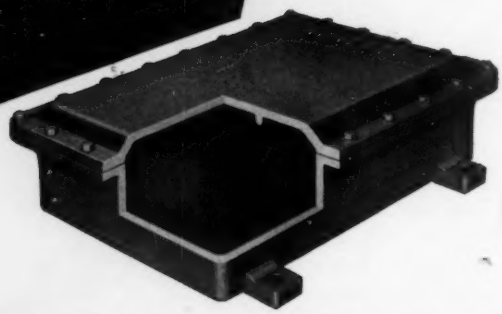
For quiet, general purpose ventilation at lowest cost, you can't beat the Coolair type CQ shown here. It's ideal for schools, auditoriums, and stores ... wherever a quiet fan is needed.

Exclusive rubber vibration insulators, as shown in the insert photo, are built into the fan frame. You can meet specifications for resilient-mounted, wall-type fans with far less installation trouble and cost. No bother with mounting fan on rubber or felt.

Proof that Coolair prices are competitive—Coolair fans were used on all four U. S. 3rd Army barracks rehabilitation projects started in the summer of 1955.

Write for Free Catalog Folder:
AMERICAN COOLAIR CORPORATION
3608 Mayflower Street
Jacksonville 3, Florida

Explosion-proof Housings cast aluminum



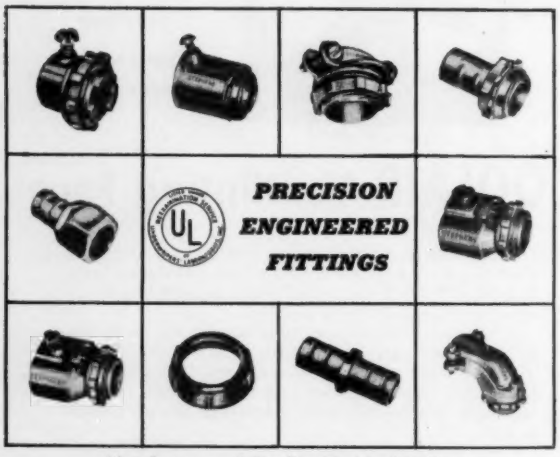
Non-sparking cast aluminum, strong and rustless. Available in a wide range of standard and special sizes.

Lightweight, easily mounts onto equipment. Drilled and tapped to specifications. Made to Underwriters and Military Specifications.

Send for Bulletin F

THE Adalet MANUFACTURING COMPANY
14300 LORAIN AVENUE • CLEVELAND 11, OHIO

M. STEPHENS MFG. INC.



Manufacturers of Quality Electrical Fittings

814 East 29th Street Los Angeles 11, Calif. ADams 1-9147

Manufacturer's Representative:

W. H. BERRY CO., INC.

45-47 Alabama St., S. W. Atlanta 3, Georgia
201 W. Worthington Ave. Charlotte 3, North Carolina

Stocks Carried in Local Warehouses

MANUFACTURERS' AGENTS
REPRESENTING OUR ADVERTISERS

This listing of Manufacturers' Agents is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. However, no allowance can be made for errors, or for failure to insert. We will appreciate your calling to our attention any corrections or omissions promptly. Only manufacturers' agents are listed here.

Fitts, Lloyd D.
B & C Metal Stamping Co. 48
Southland Sales Agents
Fanner Mfg. Co. 88
Torkell, E. E.
Kuhlman Elec.
Co. .....Front Cover

Nashville

Finney, Collin
Smithcraft Lighting Div . 73
Fowler, Joe
Prescolite Mfg. Co. 98
Matthews, Jim
Tomic Sales & Eng. Co... 38
Southland Sales Agents
Fanner Mfg. Co. 88

TEXAS

Corpus Christi

Land, Roy F.
Bulldog Elec. Prods. ..14, 15

Dallas

Anderson Co., Geo. E.
Accurate Mfg. Co. 92
Killark Elec. Co. 91
Steel City Elec. Co. 7
Brenner Elec. Sales Co.
Elliot Elec. Prods. Co. ...100
Butler & Land
I-T-E Circuit Breaker
Co. 18, 19
Crockett-Lund & Co.
Cornish Wire Co. 9
Elliott Co., Lynn
Furnas Elec. Co. 86
Galvin Sales Co.
Ideal Industries, Inc. ... 83
Hancock Co., John L.
Prescolite Mfg. Corp. ... 98
Huemmer, Walter J.
Light & Power
Utilities Corp. 2
Neo-Ray Products, Inc. ..104
Lamps, Inc.
Advance Transformer
Co. .....Second Cover
Martin Co., J. D.
Atlantic Conduit
Fittings Co. 99
Michler, Paul
Frank Adam Elec. Co. ... 51
Miller Co., Harry A.
B & C Metal Stamping Co. 48
Morgan Co., Jack
Republic Steel Co. 53
M. Stephens Mfg., Inc. ..108
Tomic Sales & Eng. Co... 38
Morton, J. E.
Buchanan Elec. Prods.
Co. 105
Musgrove Co., Curtis
Kuhlman Elec.
Co. .....Front Cover
Peabody Bros.
American Metal Moulding
Co. 92
Rome Cable Corp. 77
Robertson, Elgin B.
Preformed Line Products.. 13
Robertson & Co., Jim
Fullman Mfg. Co. 101
Stephens, V. E.
Light & Power Utilities
Corp. 2
Valkus-Kissell Sales Agency
Briegel Method Tool
Co. 20
Diamond Wire & Cable Co. 21
Knox Porcelain Co. 94
Ward Co., L. R.
Fanner Mfg. Co. 88

El Paso

Adams, Fred H.
Tomic Sales & Eng. Co. .. 38

Fort Worth

Musgrove Co., Curtis
Kuhlman Elec.
Co. .....Front Cover

Greggton

Electrical Materials Co.
Southern Lighting
Mfg. Co. 95

Houston

Brenner Elec. Sales
Elliot Elec. Products
Co. 100
Clinton, W. L.
Buchanan Elec. Prods.
Co. 105
Elliott Co., Lynn
Furnas Elec. Co. 86
Land, Roy L.
Bulldog Elec. Prods. ..14, 15
Musgrove Co., Curtis
Kuhlman Elec.
Co. .....Front Cover
Peabody Bros.
American Metal Moulding
Co. 103
Rome Cable Corp. 77
Robertson Co., Elgin B.
Preformed Line Products.. 13
Thornton, E. B.
Light & Power
Utilities Corp. 2
Walters Co., Fred
Keystone Mfg. Co. 89
Ward Co., L. R.
Fanner Mfg. Co. 88
Wilson Elec. Equip. Co.
Bulldog Elec. Products
Co. 14, 15
Winkler, B. L.
Frank Adam Elec. Co. ... 51

VIRGINIA

Arlington

Dunlop Lighting
Smithcraft Lighting Div... 73
Russell, Charles
M & W Elec. Mfg. Co. .. 96
Royal Elec. Mfg. 16

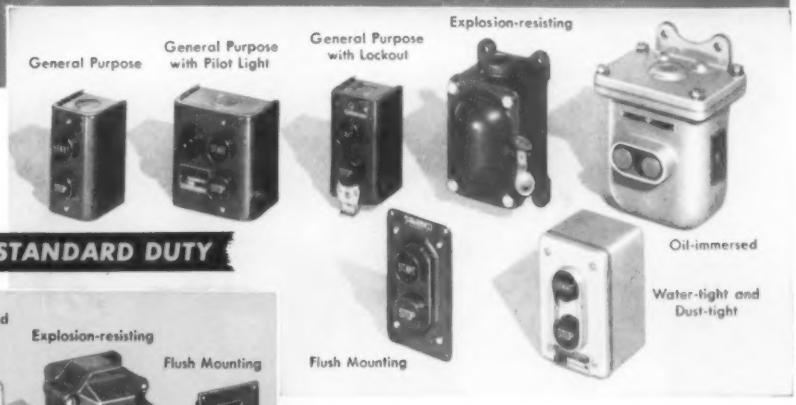
Richmond

Crews, L. J.
Briegel Method Tool
Co. 20
Epperson, W. E.
Ceilheat, Inc. 85
Fishburne, Robert W.
B & C Metal Stamping Co. 48
Lassiter Sales Co., W. H.
Atlantic Conduit
Fittings Co. 99
Prescolite Mfg. Co. 98
Mayo, Jr., Paul
Blackhawk Industries ...103
Keystone Mfg. Co. 89
Schraudt, Jr., Geo. E.
Smithcraft Lighting Div... 73
Shelor, Fred
Keystone Mfg. Co. 89
Simpson & Son, Paul
Ideal Industries, Inc. ... 83
Sullivan, Jr., Wm.
Adalet Mfg. Co. 108
Frank Adam Elec. Co. ... 51

Warwick

Johnson, S. C.
Elliot Elec. Prods. Co. ..100

THIS COMPLETE LINE MEETS EVERY NEED FOR PUSHBUTTONS



STANDARD DUTY

HEAVY DUTY

Name your pushbutton requirement—there's a Square D unit to do the job, exactly. Three complete lines . . . standard duty, heavy duty, and oil-tight heavy duty . . . each providing a wide range of operators, stations, and circuit combinations.

Write for Pushbutton Bulletins which give complete details. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

OIL-TIGHT HEAVY DUTY

Available in 1 to 16 unit sizes. 6-9-12-16 unit stations have hinged covers for easier wiring

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

JAMES E. DAVIS CHIEF ELECTRICIAN
NORTHWESTERN GLASS CO.

"Our Production schedule was frequently disrupted by needless shutdowns on a line of motors . .

until we changed to Fusetron Fuses"

James E. Davis.
CHIEF ELECTRICIAN, NORTHWESTERN GLASS COMPANY
SEATTLE, WASHINGTON

"Ordinary 500 amp. renewable fuses were blowing frequently in a 1000 amp. switch that controls a line of motors ranging in sizes up to 150 hp.

"We work on a tight production schedule, so these shutdowns with men and motors standing idle were costing us a considerable amount of money and trouble.

"As chief electrician, the problem was 'thrown in my lap'.

"A study of the situation indicated that harmless surges were causing the fuses to blow.

"We figured that the long time-lag of Fusetron dual-element fuses might correct the trouble.

"They were installed in 1953 and the original Fusetron fuses are still in service.

"We think this is quite a record because the switch is loaded to capacity 24 hours a day 7 days a week, only Christmas and July 4th excepted."

***Play Safe!* install Fusetron and BUSS Hi-Cap Fuses throughout the entire Electrical System.**

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

BUSSMANN MFG. CO. (Division of McGraw-Edison Co.)
UNIVERSITY AT JEFFERSON ST. LOUIS 7, MO.